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HORSES SADDLES AND BRIDLES

HORSES

SADDLES AND BRIDLES

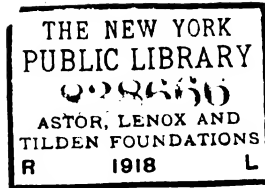
BY
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PREFACE TO FOURTH EDITION

The author deeply regrets the necessity for publishing a fourth edition of this volume at a time when the lessons of the world's greatest war are not available. The nature of the conflict, almost continuous trench warfare, has minimized the employment of mounted troops. The lessons of value will not be available until all censorship shall cease, and this seems too uncertain and far in the future to make further delay advisable.

During the past few years discussion of the types of horses for the mounted services and of horse equipments has gone on without any definite result so far as reaching a unanimous verdict. In the discussion as to the proper horse for cavalry the admirers of the thoroughbred have presented a bold front but they have not won many converts for the reason that officers generally are aware of the fact that the total number of registered thoroughbred mares in the country is not sufficient to make an impression in a war army. The same remark applies to the Arab, a most worthy little horse with many things in his favor. There is no question as to the benefits of an infusion of thoroughbred blood in animals intended for cavalry service. Some families of thoroughbred horses are of a type highly desirable for army use, but on the whole the modern animal bred for the race track may be dismissed from consideration for the mounted service in war. It would be **most** desirable if the government could fix a standard of breeding to insure a supply of remounts, but this is quite impracticable. The service must, therefore, rely upon inspectors trained to select the best animals raised on American farms, having in mind mainly conformation, breeding and stamina.

The first edition was published in 1895. At that time the cessation of Indian hostilities and consequent absence of active field

duties had begun to change the old and familiar conditions of army service. Those officers who had neither the experience of frontier service, nor the opportunities possessed by the veterans of the Civil War, to observe the operations of large bodies of troops, found need of more detailed instruction in many branches of their profession, to keep pace with modern progress and be prepared for the emergency of sudden war.

The service schools filled much of this want and, year after year, the graduates returning to their regiments with progressive ideas, gave abundant proof of the opportunities afforded to diligent and ambitious young officers to acquire a knowledge of elementary technical details as well as of the higher branches of military education. The amplification and fulfilment of the schemes of Generals Sherman, Sheridan, Upton and others, who, following in their footsteps, and recognizing the value of their initial efforts, have made it not only possible for each and every officer to thoroughly qualify himself for the important duties of his profession but have made it inexcusable for him not to do so.

The original of this volume was prepared with a view to betterment of instruction and a wider dissemination through the service of a knowledge of some elementary facts and principles essential to the well being and efficiency of the mounted branches of the army. Ignorance and neglect of essential principles have on many occasions reduced mounted organizations to so low a state of efficiency as to cause an army to lose the full measure of success from pursuit after a hard fought battle.

This volume is not intended as a treatise on equitation, but because of the narrow line of demarcation and with a view to greater usefulness in the wider field into which it has entered, some information usually found in books on horsemanship has been introduced.

It has been frequently suggested that students could more quickly learn the subject matter of the volume if paragraphed as

a manual. This the author has been unwilling to do because experience has taught him that no abiding knowledge of a subject can be acquired by such means. Many excellent manuals upon this and kindred subjects have been published in America and England. Failing as they did to arouse any interest in the general consideration and history of the subject, such manuals were soon cast aside and others took their places to meet in their turn the same fate.

Photography has been used as far as possible, because of the natural tendency to exaggeration in drawn illustrations. A glossary of terms has been inserted at the end of the volume to facilitate an understanding of the very important subjects of conformation and soundness.

A great many publications have been consulted. It has not been practicable to give proper credit in each instance, but a general acknowledgment is here made.

The author records his deep appreciation of the facilities for observation so courteously afforded him during his visits to various military establishments in England, Europe, and Japan, and of the kindness of those who aided and encouraged him in the preparation of the original volume and of the revised editions.

Partial list of publications consulted:

- Horses and Stables. (Fitzwygram.)
- The Exterior of the Horse. (Goubaux and Barrier.)
- Diseases and Injuries of the Horse. (Kirby.)
- Seats and Saddles. (Dwyer.)
- The Horse in Motion. (Stillman.)
- Parfait Marechal. (Par de Solleysol, Ecuyer, MDCXL.)
- Principes de Dressage et D'Equitation. (Fillis.)
- L'Equitation Actuelle. (Gustave Le Bon.)
- Traite D'Hippologie. (Jacoulet et Chomel.)
- Modern Horsemanship. (E. L. Anderson.)

Training Cavalry Horses. (Garrard.)
How to Buy and Sell. (Howden.)
Horses and Riding. (Neville.)
Principles of Riding. (John Allen.)
Riders of Many Lands. (Dodge.)
Bridle Bits. (Battersby.)
Practical Horse Shoeing. (Fleming.)
Records of the Rebellion.
Journal United States Cavalry Association.
Journal Royal United Service Institution. (British.)
Manuals of the Mounted Service School.
Reports Quartermaster General, 1861 to 1866.
Report of Chief of Cavalry, 1863.
Report on Diseases of the Horse (Department of Agriculture).
Report on Agricultural Grasses and Forage Plants of the
United States (Department of Agriculture).

WILLIAM HARDING CARTER.

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INTRODUCTORY.

The titanic struggle which began in Europe in 1914, and which will go down in history as The Great War, has produced an infinite development in the mechanical appliances of war. The development of the modern rifle with its flat trajectory and long range, with the advent of rapid fire field guns of tremendous power, led theorists to proclaim that frontal attacks, even by infantry, were things of the past, and that cavalry must henceforth be relegated to reconnaissance and orderly duty, but infantry continues to attack in masses, protected as much as possible by its artillery supports, while cavalry is still held in reserve for the long hoped for end of trench or siege warfare.

Cavalrymen reason that in every campaign of real importance, there comes a supreme moment in battle, or immediately thereafter, when the presence of a well-trained and fit body of horsemen is worth all the cost of their maintenance during years of peace. This condition of fitness for great and prolonged exertion can best be brought about by a general diffusion through all grades of that technical knowledge which makes each link of the chain fulfill its function.

It is not unusual in service to hear intelligent men, who have not given the subject much consideration, express sneeringly their disapproval of the great care which cavalry officers insist shall be given to animals at all times, yet history evinces beyond possible refutation that full success has often been just out of reach of an army because of the abuse of horses by those who had failed to comprehend some very elementary cavalry principles.

Theoretical knowledge is of value in any profession; it comes with study and not by instinct. In no other subjects is it more necessary to have theory and practice go hand in hand than in

those which concern cavalry. Books alone cannot convey a knowledge of the powers and endurance of commands under varying conditions of service.

A knowledge of horses, saddles, and bridles is of more importance to the cavalry officer than to any other rider, because good biting, saddling, packing, and riding are what make up the efficiency of cavalry, and provide for an economical administration of that important arm. Actual experience on the march is the only method of testing the value of saddles and other equipments, and the capacity of horses to carry their riders and packs without breaking down.

Even those familiar with war have little appreciation of the enormous numbers of horses and mules required to replace those used up by armies during actual field service.

The Quartermaster-General in his report for the year ending June 30, 1864, says:

"It appears, therefore, in practice, that the quartermaster's train of any army requires, on the average, one army wagon to every twenty-four or twenty-five men, and the animals of the cavalry and artillery and of the trains will average one to every two men in the field."

It should be remembered that this was written long after the extravagant ideas of transportation which prevailed during the early part of the war had been eradicated.

Ignorance as to the great expense necessary for the proper maintenance of cavalry became so apparent during the first two years of the Civil War that, in an order establishing the Cavalry Bureau, published by the Secretary of War at the close of the Gettysburg campaign, the following paragraph was inserted:

"The enormous expense attending the maintenance of the cavalry arm points to the necessity of greater care, and more judicious management on the part of cavalry officers, that their horses may be constantly kept up to the standard of efficiency for

service. Great neglects of duty in this connection are to be attributed to officers in command of cavalry troops.

“It is the design of the War Department to correct such neglects, by dismissing from service officers whose inefficiency and inattention result in the deterioration and loss of the public animals under their charge.”

Under the circumstances the establishment of the Cavalry Bureau was an urgent necessity. It at once became a potent factor in the conduct of the war, systematized and improved the remount purchases for the large bodies of cavalry in the field, and materially aided in making possible their succession of victories during the last eighteen months of the war.

With proper care in the inspection and purchase of horses, sound and healthy animals are generally procurable. The inspection of remounts is a very important duty and the care and intelligence with which it is performed have a marked effect on the efficiency of the service.

When bought under contract the price paid by the government for horses is usually fixed by the lowest bidder. It is not therefore to be expected that ideal animals will be presented for inspection, but only such as the contractor can procure at a lower price than he himself receives. There will be a few first-class, many fair, and a superabundance of indifferent and mediocre horses presented.

Those sometimes called upon to decide the good points or defects of horses may not be naturally endowed with the peculiar qualifications necessary for the solution of the problem. Those whose duty may *require* them to perform this work, may by intelligent observation, education, and experience, obtain a satisfactory degree of proficiency, especially if possessed of natural aptitude and not swayed by prejudice and fashion. The faculty of judging implies not only attention but a well-balanced ability for comparison.

It cannot be expected that every officer will become perfect in so difficult a matter as the inspection of horses, but with proper encouragement the service should be able to supply an ample number of trained officers to meet all demands in peace and war.

During peace the manner of purchase is not so important, except that a system should be established which will need no change in time of war. In war a Remount Bureau is a necessity. It should, therefore, be maintained in peace so that the lessons of war may not be lost. It should be under charge of a competent officer who should control the general policy as to remounts, and have at all times a list of officers and veterinarians qualified and available for duty in the remount service.

Out of the experience of the past came the immediate establishment of a remount service when war was declared with Germany. At the outbreak of war the remount business was carried on as part of the transportation division of the quartermaster-general's office. There were five remount depots. The work expanded under the demands of war and by the end of the year 1917 there were more than three hundred officers and eleven thousand men engaged in the remount service at thirty-four depots. The number of public animals was then five times greater than at the outbreak of the war and totaled about three hundred and fifty thousand, and one thousand veterinarians and twelve thousand enlisted men had been brought into service to insure proper care of the animals.

Experience in Europe and India has clearly demonstrated that military horse breeding farms are enormously expensive, when the number of misfit colts is considered, and are altogether inadequate to meet the demands of modern armies. One or two European governments continue to provide a portion of the horses for their cavalry from their own breeding establishments or by acquiring first rights of purchase through the grant of free service of the stallions retained by the government for that purpose.

This system has been repeatedly urged for adoption in America, but there are so many good reasons for not doing so, that it is safe to conclude that the horses required for public service will continue to be purchased from private breeding farms. With so unlimited an agricultural country, there should never be any lack of suitable horses of any class for which there is an active demand at fair prices. It is not necessary for the government to breed horses for cavalry purposes. Equally as good, if not better, results may be obtained by training a large number of officers to the duty of inspecting and selecting animals and buying them from breeders whenever possible. In conflicts of such dimensions as the Civil War and the present war in Europe the number of animals required could not have been furnished by a reasonable number of government breeding establishments.

The horse, if selected with care and properly used, is capable of rendering long and valuable service. A knowledge as to how to develop his full capacity for making hard marches while still retaining his health and vigor does not come intuitively, but as a matter of experience and keen observation. The merest lout who can ride fairly light, may take a horse over an immense distance in a single ride, but he will, in all probability, expend the entire vital force of the animal, and leave him a broken-down, spiritless wreck at the end of his journey.

There is an infinite amount of hardship and drudgery connected with service in the ranks of any cavalry. It is necessary, therefore, to have not only ability to ride and intelligence to reconnoiter, but capacity in both man and horse to sustain long-continued exertion of the most arduous character. If either man or horse becomes exhausted or loses spirit, the effect is soon felt by the other.

The trained horse of the high school is not regarded as the ideal animal for service, but too great stress cannot be laid upon the value of the riding school as a means of bringing all the men and

horses to an average state of efficiency. Some men, and horses also, are very slow to acquire that individual instruction which is so essential to correct maneuvering in large bodies.

History teaches that successful cavalry action, whether it be battle, raid, or strategic march, is invariably attended with a loss of horses greater than the corresponding loss of men. In campaigns of magnitude, especially at distances from depots which prevent broken-down animals from being turned in for recuperation, the loss must be replaced by untrained horses. It is a recognition of this invariable experience in the United States which causes the War Department to demand that cavalry officers themselves shall instruct the men and train the horses, rather than place dependence upon riding-masters and remount training depots. The great need in the American army is the development of the latent ability in young officers, to enable them to disseminate through the various regiments a more general and accurate knowledge of military horsemanship and horsemastership.

The cavalry comprises a class of riders from which a great degree of uniformity is demanded. The necessity arises from the existence of a special and narrowly defined object to be attained. The possibility of accomplishing it exists only when both men and horses are selected with reference to this object. Some men are born riders, and if taken in service young soon adapt themselves to cavalry riding. Such men are usually of a peculiar build, which combines strength and vigor with lightness and dexterity, and possess that peculiar temperament which enables them to train horses to perfection.

All men are not so gifted, and in order to train this large majority, the officer should acquaint himself with everything that pertains to the horse. The presence in the ranks of untrained riders is bad in peace and criminal in war, but every army has them. In order to neutralize the effect of their ignorance, good, well-fitted saddles and bits are prime necessities. It is the pain

and excitement caused in young, nervous horses, by powerful bits in the hands of thoughtless or poor riders, which make them degenerate into plungers and bolters. Curb, spavin, broken knees, and other injuries may frequently be traced to the same cause. Horses thus injured are condemned and sold for a mere trifle, and the indifferent rider is placed on another animal, not infrequently to repeat the same experience through ignorance.

With peace conditions and unlimited time it requires only ordinary care to gradually instruct both men and horses so that large bodies of cavalry may be marched and maneuvered with sufficient accuracy to justify the expectation of success in battle. The rate at which remounts must be supplied, however, when hard marches, with insufficient forage, and battle losses are encountered, makes it clear that all the men must be taught to manage horses untrained for military purposes, to the end that cavalry commands may perform their full duty in active campaign. The ability to stick on a runaway or bucking horse is of secondary importance to the knowledge of horsemanship which makes it possible for a commander to maneuver and fight large bodies of cavalry.

No more costly or humiliating lessons were learned during the Civil War than those relating to cavalry service. The enthusiasm, patriotism, intelligence, and courage of the American cavalrymen were proven in many fields, but bitter experience taught them that those desirable qualities do not alone command success. Training, discipline, and patient work are more potent than patriotism, coupled with ignorance and lack of experience.

CHAPTER I.

THE CAVALRY HORSE.

Inspection of Cavalry Horses.—Remarks on Judging Horses.—Nomenclature of the Horse.—The Skeleton.—The Superior Muscles.—The Exterior Regions.—Examination of the Horse.—Relations Between Dimensions of Certain Parts.—Examination in Detail as to Form.—The Head; Neck; Withers; Shoulders; Back; Ribs; Chest; Lower Line of Chest and Belly; Fore Legs and Feet; Hind Quarters; Tail; Body.—Detection of Lameness.—Artillery Horses.—Examination for Soundness.

The qualifications, as to general character, age, height, and weight of animals for the public service are fixed from time to time by the War Department.

The inspection of cavalry horses is conducted by officers and veterinarians detailed for the purpose. The knowledge required by the inspecting officers is such as will enable them to form a correct judgment concerning the adaptability of the animal for service, as shown by his breeding and *conformation*. Only the horses which pass this examination are submitted to further scrutiny of the veterinarians who make the detailed examination for *soundness*.

Inspecting officers are responsible in general for a determination of all questions as to conformation, quality, size, action, and suitability of an animal for the service for which intended. The veterinarian's duties relate particularly to questions of age, health and soundness.

The form of a horse determines to a great extent his fitness for service, and enables a fair prediction to be made as to his various qualities, provided he is sound. It requires judgment, much instruction, and long practice, to correctly estimate the relative

value of various points, and to determine whether the good qualities counterbalance existing or probable defects.

Good points in a horse are not mere matters of beauty, but shapes which, on mechanical principles, are likely to answer the required ends. However, shapes which may be objectionable for one class of work, are not necessarily so for another. Thus small "chunky" or pony-built horses are better for work in the mountains, than larger and longer coupled horses.

Remounts for cavalry must have certain qualifications, the most important of which are the possession of sufficient mobility to execute tactical maneuvers at varying degrees of speed and the ability to stand hard service while carrying great weight. It should be constantly borne in mind that cavalry horses are required to carry loads on their backs averaging about one-fourth their own weight.

In purchasing thousands of horses to meet a great emergency conformation and soundness are the things to which attention is mainly directed, but there are some other requisites, however, which are absolute essentials in a saddle horse worthy of the name. The most important of these are a gentle disposition; a good mouth; regular and easy gaits, without stumbling, interfering or over-reaching; courage and ambition, without being nervous or fidgety; of proper size to carry the weight, which for cavalry service requires a horse about fifteen to fifteen and three-fourths hands high, and weighing from 950 to 1100 pounds.

While useless to search for perfection, it is well to study all the points of the ideal horse, in order to promptly recognize them when seen. The points taken together constitute the *form*, which must not be confounded with particular attitudes assumed by the horse, for an animal whose conformation is perfectly adapted to service, will frequently assume such awkward positions while standing in a stall, or at the picket line, as to entirely deceive any but a well-trained eye.

Figure 1. The Skeleton of the Horse.

E.

The points of a horse are observed more quickly when he is brought beside an animal selected as a model. As soon as a horse is found which is a suitable model, he should be retained at hand for comparison.

In conducting an examination of horses, he who possesses a knowledge of the anatomy and physiology of the animal will have a great advantage over one who does not.

A general knowledge of the construction of the skeleton and the superficial layers of muscles is very desirable, but it is not at all necessary for ordinary purposes to burden the mind with the names of all the bones and muscles.

Figure 1 represents the celebrated race-horse "Eclipse," pronounced by high veterinary authority to be perfect. The form of the skeleton is indicated in outline. The nomenclature of the skeleton is as follows:

- | | |
|---------------------------------|------------------------------------|
| 1. Zygomatic arch. | 24. Great trochanter. |
| 2. Eye cavity. | 25. Small trochanter. |
| 3. Face bones. | 26. Thigh bone. |
| 4. Incisor teeth. | 27. Ischium. |
| 5. Molar teeth. | 28. Radius or fore-arm bone. |
| 6. Lower jaw. | 29. Carpal or knee bones. |
| 7. Atlas, 1st vertebra of neck. | 30. Trapezium. |
| 8. Axis, 2d vertebra of neck. | 31. Cannon bone. |
| 9. Cervical vertebræ (5). | 32. Pastern bone. |
| 10. Spinal processes of back. | 33. Sesamoid bone. |
| 11. Dorsal and lumbar vertebræ. | 34. Small pastern bone. |
| 12. Sacrum. | 35. Upper end of leg bone. |
| 13. Tail bones. | 36. Stifle joint. |
| 14. Shoulder blade. | 37. Leg bone or tibia. |
| 15. Acromion process. | 38. Point of hock. |
| 16. Hollow of shoulder blade. | 39. Hock joint. |
| 17. Upper end of arm bone. | 40. Head of small metatarsal bone. |
| 18. Arm bone or humerus. | 41. Cannon or metatarsal bone. |
| 19. Elbow bone. | 42. Coffin bone. |
| 20. Cartilages of the ribs | 43. Fetlock joint. |
| 21. Ribs. | 44. Patella, or stifle. |
| 22. Haunch | 45. Fibula. |
| 23. Haunch bone. | |

Figure 2 shows the exterior muscles of the horse as they appear with the skin of the animal removed. Some of the deep-seated and powerful locomotive muscles are not shown, and the one over the ribs is omitted. The names of the muscles are all of a

Figure 2. Superior Muscles of the Horse.

technical character to indicate location, or action, and are omitted because knowledge of them is only necessary for a scientific study of the physiology of the horse.

The principal muscle for consideration in the figure is the long muscle, or system of muscles of the back. It fills the angular space on each side of the spinous processes, giving roundness to the back. It is very broad and thick over the loins, and in addition to other connections, it is strongly attached to the hip bone. It is attached forward to all the spines of the vertebræ, as far as the neck, and to a strong tendon-like membrane that is firmly fastened to the same bones. Special interest attaches to this muscle and tendon, because the saddle must rest upon it in such a way as not to interfere with the muscular action of the fore and hind quarters.

Figure 3 is numbered so as to locate the external regions of the horse. It is absolutely necessary to commit to memory this nomenclature in order to describe horses as well as to understand what is referred to by others when mentioning the parts.

The nomenclature of these parts is given, as far as possible, in plain language, but some technical names are used because there are no popular names for the parts thus mentioned.

If many horses are to be examined, copious notes should be retained by the inspecting officer for self-protection, and every horse passed should be branded with a number on the hoof for identification on the descriptive list, and also have the brand common to all public animals put on in the presence of the inspectors at the close of each day's work. The descriptive lists should be prepared without delay and should be an accurate transcription from the notes made as each horse is branded.

Figure 3. External Regions of the Horse.

Nomenclature of the External Regions of the Horse.

1. Lips.	13 ¹ Mane.	27. Testicles.	40. Thigh.
2. Nose.	14. Jugular	28. Shoulder	41. Stifle.
3. Face.	channel.	and arm.	42. Buttock.
4. Forehead.	15. Chest.	29. Elbow.	43. Gaskin.
5. Eyebrows.	16. Withers.	30. Forearm.	44. Hock.
6. Forelock.	17. Back.	31. Chestnut.	45. Chestnut.
7. Ears.	18. Ribs.	32. Knee.	46. Cannon or
8. Lower jaw.	19. Girth.	33. Cannon or	shank.
9. Cheek.	20. Loins.	shank.	47. Fetlock joint.
10. Nostril.	21. Croup.	34. Fetlock joint.	48. Fetlock.
11. Poll.	22. Tail.	35. Pastern.	49. Pastern.
11 ¹ Throat.	23. Dock.	36. Coronet.	50. Coronet.
12. Parotid	24. Flank.	37. Foot.	51. Foot.
gland.	25. Belly.	38. Fetlock.	
13. Neck.	26. Sheath.	39. Haunch.	

Descriptive lists of public animals should set forth the age, sex, color, distinguishing marks, the weight when specified in the contract and all blemishes which include saddle and collar marks, wire cuts, scars, splints, and abnormal enlargements. Distinguishing marks include, ordinarily, the "star," a white spot on the forehead; the "blaze," a white stripe running down the face to the lips; the "snip," a white streak or spot on the lower part of the face near the nostrils; "stockings," as white legs on other than grey horses are called; "white feet," which covers those cases where the white does not extend above the fetlock; color of mane and tail, designated "black points," "silver," or whatever color exists different from that of the animal. Where the color of the mane and tail is the same as that of the animal, it may be entered as "self color," or by citing the actual color.

It may happen at times that officers will be called upon to examine horses without the assistance of a veterinary surgeon. The "examination for soundness" and the chapter on the more common diseases and injuries will give sufficient knowledge to conduct fairly well the examination for soundness, provided the information contained therein is systematically applied to the cases available for observation in service from day to day.

It is usually quite easy for an experienced inspector to determine generally whether a horse is in good health or the contrary. In health the attitudes assumed when standing are easy and natural; the coat is lustrous; in motion the gaits are regular and active; the head is carried rather high than low; respiration is full and calm.

A sick horse, or one suffering from injury, shows something is wrong by his unnatural attitudes; dull coat; inattention; hang-

ing of the head ; manner of changing positions ; irregularity of and halting manner in executing the gaits ; in some cases very listless and indifferent, in others uneasy. If lame from a wound or bruise he will endeavor to ease up on the leg affected. In fact the horse will show in a great many ways that something is wrong.

Figure 4.
Pointing a Toe.

Figure 5.
Pointing a Toe.

If unable to decide upon any question arising during the examination, the government should be given the benefit of the doubt.

Whenever possible to see animals in their own stalls, it should be observed whether or not they kick, which may usually be discovered by shoe scars on the heel posts and sides of the stall ; or if they crib, a term used to describe the gnawing of the wood work about the mangers and feed boxes.

If a horse points a toe, or shows other signs of weakness or lameness, it can be more easily discovered at this time than when crowded in public stables or sheds with large numbers of other horses. By "pointing a toe" is meant the act of resting a fore foot on its toe, or holding a fore foot forward to remove the weight of the body from it (figures 4, 5, and 6). ✓

A sound horse shifts his weight, to rest, from one hind foot to the other, but rarely does this with his fore feet. It may be accepted as an almost invariable rule that a horse never tries to rest a fore foot unless there is lameness or disease. Lameness may arise from having been recently pricked in shoeing, but under no conditions should a horse be passed for cavalry service which, at the time of inspection, does not stand squarely upon both fore feet. ✓

Few of the stable vices can be cured, and unless horses are badly needed for immediate field service, animals known to have them should be rejected. Some stable vices may be acquired from other horses, and it is therefore very desirable to avoid introducing into cavalry stables animals which may spoil others compelled to stand near them. In addition to kicking and cribbing, which are about the worst habits a troop horse can have, may be mentioned weaving or the swaying motion so common to caged animals, continued pawing, pulling back when tied, biting, and wind sucking. The wind sucker takes hold of the wood work,

Figure 6.
Pointing a Toe.

picket line, or halter strap, arches his neck and draws back with a grunting noise (figure 7).

The line of demarcation between blemishes and defects is sometimes very dim. Under the first named come all abnormal conditions of the various parts of the horse which do not affect

Figure 7. Wind Sucker.

his serviceability, such as scars and splints so placed as to be of no consequence.

Under the head of defects come pegged splints and those very close to the knees, ring bones, side bones, false quarter, quarter cracks, sit-fasts, and any trouble, local or constitutional, which may tend to shorten or render unsatisfactory the service of the animal. These will all be treated in detail later for the guidance

of the inspector, as well as with a view to amelioration and cure when they occur in animals already purchased.

In considering the subject generally veterinarians have arrived at the conclusion that many forms of diseases of the horse may be acquired through heredity. This is true in a sense, but in most cases the parts played by sires and dams relate only to conformation. If that be not good many abnormal conditions may follow, for undoubtedly horses of faulty conformation are more prone to certain forms of disease than are horses of good conformation.

Horses should be examined, if possible, in the open air. When this is not practicable, an open passageway or shed should be selected, where plenty of light may be had. When the horse is led out, he should be examined in profile from in front and behind, from the right and left, and obliquely forward and backward, careful attention being given to his temperament and attitudes in the meantime

View the horse in all possible aspects, to determine the general harmony of his whole conformation. View the formation of the feet and legs separately and in pairs; the shape, expression, and size of the head generally and in detail; the shape of the back and withers, with reference to carrying a saddle.

In the general observation of the horse, the eye should be trained to note quickly whether the forehand and hindhand bear proper relation to each other as to weight; whether the abdomen is so shaped as to hold the saddle by means of the cinch alone—breast straps are not issued for cavalry horses—; whether the legs are strong enough for the combined weight of the horse and trooper with his equipment; whether the head and neck are of the

character likely to respond readily to the rider's hand (figures 8, 9, 10 and 11).

Figure 8. Saddle Gelding "Comus." Winner of many first prizes in saddle classes.

The examination should be made on unshod horses, but if animals are presented shod, special attention is necessary to see if shoes have been put on for the purpose of correcting defects.

A good horse is one with many good, few indifferent, and no really bad points. One radically bad point neutralizes any number of good ones. Excess of power or development in one part of a horse may not only be useless, because the strength of the animal

Figure 9. Saddle Gelding "Highland."

is limited by the weakest point, but it may be a positive source of evil. For example, a strong, powerful forehand is not an advantage if the hind quarters are light, because the strain on the hind legs will be unduly great. Similarly, if the fore legs are weak

they may suffer from excessive propulsion communicated by powerful hind quarters, whilst they might have lasted a long time if all were proportionately developed. In a well-formed horse

Figure 10. Thoroughbred "Prince Palatine" by "Persimmon," dam "Lady Lightfoot." Winner of St. Leger Stakes, 1911; in 1912, Ascot Gold Cup (two and one-half miles); Eclipse Stakes (one and one-fourth miles); Doncaster Cup (two miles and one furlong); and Jockey Club Stakes (one mile and three-quarters). "Prince Palatine" was sold for £40,000.

there should be no weak point, and no part with excessive development, as compared to the other (figures 8, 9, 10 and 11)

Outward forms are mainly dependent on the formation of the

bony skeleton. In a well-bred horse the tendons, ligaments, and muscles are generally in keeping with the bones; that is, large bones usually give attachment to large, powerful muscles, tendons,

Figure 11. Arab horse of famous family.

etc. The processes of the bones are better developed, and give a greater mechanical advantage to the muscles than in the case of common country horses. Without good structural formation strength will not be found, and even with it, all the desirable qualities should not be expected.

The power of a horse increases with his size, provided the relative proportion of the parts and the general compactness are maintained. This, however, is rarely the case. There is a certain size beyond which the parts do not seem to grow in due proportion to each other. Very large horses are seldom fit for saddle purposes; on the contrary ponies are often great weight carriers.

There are some relations between parts of the horse which it is well to consider as an aid in training the eye. In this way it may be decided at a glance if a horse approaches the average form accepted as most suitable for service.

The horse shown in figure 12 had a well-earned reputation as a weight carrier and long distance cavalry horse.*

The position is not constrained; it is the natural and free position assumed by the horse without assistance or interference. It will be observed that the frontal line of the head is nearly or quite parallel to the slope of the shoulders. Taking the head, measured from the poll to the extremity of the upper lip, as a unit, it will be found to enter as a factor quite accurately into several

* The horse, "Deadwood," pictured in figure 12, was purchased at five years of age, and after eight years of service, although very fat, appeared perfectly sound and moved at a walk, trot and gallop without stiffness or peculiarities of gaits.

He was ridden by the orderly for the quartermaster of the Eighth Cavalry on the march from Fort Davis, Texas, to Fort Meade, South Dakota, in 1887, a distance of about nineteen hundred miles. As the orderly accompanied the quartermaster in looking for camping ground, purchasing forage, and riding back and forth to the wagon train, it is a low estimate to place the distance covered by this animal at twenty-five hundred miles. He continued to perform duty in field and garrison and won new laurels for hard service in the Philippines; he was undoubtedly enabled to do this because his form was well adapted to the weight-carrying requirements of cavalry service.

important measurements. The head should be measured as a shoemaker does the foot, and not with a tape-line.

This length of the head AB is almost exactly equal to the distance: 1. From the top of the withers to the point of the

Figure 12. Relative Proportions.

shoulder CD ; 2. From the lowest point of the back to the abdomen EF ; 3. From the point of the stifle to the point of the hock IJ ; 4. From the point of the hock to the lower line of the hoof JK ; 5. From the shoulder blade to the point of the haunch LM .

Two and one-half times the head gives: 1. The height of the withers *C* above the ground; 2. The height of the top of the croup above ground; 3. Very nearly the length from point of the shoulder to point of buttock *DH*.

Do not expect every horse to fill these conditions, but remember that a small fraction of the length of the head added to his height or length, will at once give the animal an abnormal appearance. The length or height of a horse will seldom, if ever, equal three head lengths. Perfection of form is usually found to a greater extent in horses under fifteen-and-a-half hands high, than in those of greater height.

If proportions are satisfactory, examine the muscles in a general way to form an estimate as to the probable endurance of the animal. Firm, dense, compact, and clearly defined muscles are requisite for weight carriers.

The examination should next take a more detailed character, remembering always, that although race-horses may run and win in all forms, cavalry service demands a marked degree of uniformity of conformation, and the higher the grade of excellence secured the more economical and enduring will be the results.

Before proceeding with the examination, the age and height of the animal should be ascertained, to determine whether these come within the limits specified in each contract or letter of instructions. In making the detailed inspection it is customary to begin with the head.

The Head.—The head should be small and well set on the neck; ears small, thin, and erect; forehead broad and face straight; eyes large, prominent, mild in expression, and with fine eyelids; vision perfect; lips thin and firmly compressed, nostrils large and open; the branches of the lower jaw wide apart where the head is attached to the neck.

When carefully observed, a great variation is seen to exist in the size and shape of the heads of horses. A wide forehead is nearly always accompanied by large nostrils, well situated eyes, ears small and widely separated, distance from the eye to the angle of the jaw great, large space under and between the jaws, head short and not of great volume. On the contrary, a narrow forehead is accompanied generally by small nostrils, eyes but partly open and appearing small, ears large and close together, and with but

Figure 13. Roman Nose.

Figure 14. Straight Face. Fine Head.

small space under and between the jaws. The head first described is the one best adapted to the saddle horse; the second or coarse head acts like a heavy weight at the end of a long lever, bringing forward the center of gravity, and making the horse heavy in hand.

The frontal line of the head may be convex, making a "Roman nose" (figure 13); straight, which is the usual and best form (figure 14); or concave, making a "dish face" (figure 15).

Many excellent horses are found with "Roman noses," although this class usually has a reputation for being heavy in hand and sometimes headstrong.

The nostrils should be large, and occupy nearly the whole of the lower part of the facial structure, because the horse breathes



Figure 15. Dish-Faced.

entirely through his nostrils, and not partially through his mouth as man does. The lower part of the head, including the nostrils and lips, are commonly spoken of as the muzzle.

The ears should be delicate and pointed, and should move backward and forward with a quick, firm motion, without the least appearance of flabbiness. The temper of the horse may be judged somewhat by the eyes and ears.

Figures 14 and 16 represent two entirely different types of good heads. The first is the head of a very fine saddle animal, characterized by docility and intelligence, and perfection as to gaits. The second has an unusual depth from the eye to the point of the jaw, and the depression in the frontal line known as "dish-faced."

The Neck.—The neck should be of medium size and moderate length, tapering toward the head, with its upper border or crest longer than the under side, and with mane intact and fine.

Figure 16. A Good Head, with slight "Dish Face."

The neck should be examined as to its form, carriage, and mode of attachment to the head. The neck is called straight when its borders are rectangular (figure 17) ; arched, when its upper border is more or less convex throughout (figure 18) ; ewe-necked, when its upper border is concave (figure 20).

The long neck accords well with extreme speed, the short neck with power, and the medium neck for all around saddle purposes, and in which class there is a wide range of intermediate forms. Very long necks are too mobile, while very short ones are not supple enough. Very long necks also have the disadvantage of

over-weighting the forehand of cavalry horses by bringing forward the center of gravity. The volume of the neck should not be too large. A fine, silky mane characterizes a well-bred horse; and a coarse, long, and stiff mane usually denotes a common horse.

Figure 17. Standard Bred Morgan Mare. Straight neck and back; low withers.

The Withers.—The withers comprise the region between the shoulders in front of the back, and should be elevated but not high and thin. As many of the muscles, ligaments, and tendons which control the motion of the forehand are attached here, some degree of elevation is necessary in order to afford good leverage, as well as to give due length to the shoulder (figure 18).

Elevated withers are usually accompanied by long, sloping shoulders and a rather deep chest. Horses with very high

Figure 18. Good Head, Neck, Shoulders, and Fore Legs.
Proper Elevation of Withers.

withers, while pleasant to ride, are unsuited for hard service with packed saddles. High, thin withers are usually accompanied by flat muscles about and in rear of the shoulder blade, where the

front end of the side bars of military saddles are intended to rest ; this flatness allows the saddle to slip unduly forward, which is very objectionable (figure 19).

Figure 19. This Troop Horse was possessed of a good carriage until completely broken down; is a good example of overlooking grave defects because of one or two good points; high, thin withers; deficient back and loin muscles; "tucked up" abdomen; "tied in" below knees; insufficient bone in legs.

Horses with low withers, not well defined or outlined, are not suited for heavy, packed saddles, because such a conformation permits the saddle to slip forward and bruise the parts near the

top of the shoulder blade, and this displacement also causes sores to be made by the cinch close to the fore legs (figure 17).

The Shoulders.—The shoulder of the saddle horse should be sloping, well muscled, and comparatively long (figures 8, 9, 10, 11

Figure 20. Ewe Neck; Excessively High Withers.

and 18). If the shoulder blade is long, broad, and well sloped, the saddle will sit properly in its place; while if short and upright, the saddle will have a tendency to work forward on the withers. Upright or straight shoulders are very undesirable in saddle horses, although perfectly suitable for purposes of draft. Un-

due thickness through the shoulders increases the weight of the forehead, and consequent wear on the fore legs, without any compensating advantages in the case of a saddle horse.

While all authorities agree that a sloping shoulder is essential in a good saddle horse, and many speak of it in an offhand way, it will be found most puzzling to determine exactly how to class shoulders in fat horses.

If the shoulder is straight, and the horse be otherwise acceptable, the best plan is to mount him; if he is, as he ought to be with such a shoulder, very rough, he should be rejected for saddle purposes.

The Back.—The back should be short, straight, and well muscled. Backs are classed as straight, roach-back (convex), or sway-back (concave). The straight back is a sign of strength, and with this conformation the saddle will rest in a good position. The roach-back, while strong, is unsightly and not adapted to free and rapid motion. The sway-back may be congenital or acquired, and is the most faulty of all for saddle purposes, because the weight is almost entirely sustained by the ligaments, and the saddle is certain to bore into the muscles of the back.

Short, straight backs are the strongest for weight carriers, but a certain amount of length is essential both for speed and jumping; moreover a horse with a very short back is apt to overreach.

Sometimes the line of the back is higher behind than in front, and sometimes higher in front than behind. These forms entail an unequal distribution of the weight of the body upon the four extremities.

The Ribs.—The ribs should be well arched and definitely separated. This curvature, taken with full development of length, and

definite separation from each other, constitute desirable points of excellence.

Flatness, shortness, and nearness together are undesirable, because they limit the volume of the chest, and characterize the horse as short-winded and deficient in power.

The Chest.—The chest comprises the forward part of the body which incloses the heart and lungs. The chest proper extends back to a line drawn around the body crossing the back some distance in rear of the withers and passing underneath forward of the belly. The front of the chest is commonly called the breast. The chest should be full deep, moderately broad, and plump in front. Narrow-chested

horses lack endurance; such animals usually spread their feet wide apart to maintain their equilibrium even when standing still (figure 21).

The capacity of the lungs is marked by the size of the chest at the girth. While excessive width in front is not desirable for rapid gaits, such form is well adapted to carrying great weight. The fore legs should spring from the chest perpendicularly, as viewed from in front (figure 22).

Figure 21. Narrow Chest indicates lack of endurance.

Lower Line of Chest and Belly.—From a point just in rear of the elbows the lower line of the chest and belly should be nearly or quite horizontal. If the belly be large and hang down the horse will not be fit for any but slow work. The tendency of such a form, when the animal is used for saddle purposes, is to work the cinch or girth forward against the elbows and cause cinch sores on the lower part of the chest; there is also a tendency of the saddle to move forward on the withers.

If from want of proper length and curvature of the ribs the circumference of the body decreases rapidly from the forehead to the rear (figure 19), the horse presents the condition known as “tucked up” in the belly. The tendency in this case is for the cinch and saddle to slip back unless breast straps are used.

Figure 22. Front View of
“Deadwood”

Such horses are very unsatisfactory and no amount of otherwise good qualities compensates for this defective girth in a cavalry horse. This form of horse is lacking in aptitude for retaining flesh under short rations and

hard work, conditions which almost invariably attend cavalry on active service.

The Fore Leg.—The fore leg should be vertical and properly placed; the elbow prominent and clear of the chest; the forearm large above, long and heavily muscled. The upper bone of the leg should be long in proportion to the lower or cannon bone. This bone cannot well be too large or too fully supplied with muscles. When the horse is examined in profile this bone should be vertical, and when viewed from in front, parallel to the median plane of the body.

The knee should be wide from side to side, and thick from front to back. The vertical direction of the upper bone, and cannon or lower bone, should be maintained at the knee (figures 18 and 22).

A condition known as “over in the knees” or “knee sprung” generally results from overwork and strain; it may be congenital, and therefore not an unsoundness, but a horse with that conformation is not desirable for service (figure 23).

The opposite condition, known as “buck” or “calf” knees, is decidedly objectionable, owing to the undue strain brought on the ligaments and tendons.

The leg just below the knee should not be very small or “tied in,” which indicates a weakness of the part, but should be as large as the other portions of the limb in that vicinity. The back tendons should run parallel to the cannon bone and not adhere closely just below the knee. If the bone at the back of the knee—trapezium—is not prominent, the objectionable conditions mentioned will be almost certain to exist and the animal cannot stand hard service (figure 19).

The large or cannon bone, between the knee and fetlock, cannot be too short or too strong. It should be straight, as any deviation from a straight line is both a sign and cause of weakness.

The pastern, consisting of the upper and lower pastern bones, should be strong, not too oblique, and of moderate length. If the

Figure 23. Over in the Knees or Knee Sprung.

horse is standing squarely on his feet and a line be dropped from the shoulder opposite the middle of the fore leg to the ground, it

should strike immediately behind the hoof ; if it passes forward of this point the pastern is too upright ; if it passes to the rear of it the pastern is too much sloped. In the first position the chances of a long and serviceable career exist ; in the second, the bony column of the fore leg will receive all the concussion, the animal will be rough under the saddle, and will soon be disabled by the heavy weight of the rider and pack ; in the third, the horse will be easy and pleasant to ride, but will soon break down from strain of the ligaments (figure 24).

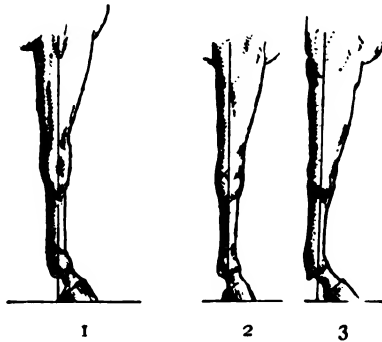


Figure 24. Slopes of Pastern.

The feet should be somewhat circular in shape, of medium size, due regard being had to the size and shape of the horse, and there should be no visible difference in the feet as to size and form. They should be neither too flat nor very upright. The fore feet being on the same line, the distance between them should generally be equal to the width of one of the feet.

A flat foot is one in which the sole has little or no convexity, and the weight of the animal is received on the entire surface as it

rests on the ground, instead of on the hoof wall. Such a foot is peculiarly liable to bruises and corns. The fore feet appear broad, low heeled and with the wall less upright than in the normal foot.

Club foot is a term applied to a foot having an upright or nearly perpendicular wall. The heels are high, which throws undue weight on the toes. This condition is more common in mules than horses.

The shape and size of the foot, if not modified by disease or injury, is a good indication of the character of the animal as well as of the locality in which raised. The horse reared on moist, soft pastures, has large, spreading hoofs and is usually a lymphatic animal, unsuited to any but slow work; the horse raised in a dry climate and whose feet are small with dense and tenacious hoofs is usually a compact wiry, and vigorous animal.

Change their relative habitat and in a few generations the shape and sizes of their hoofs would be entirely reversed to meet new conditions of nature.

Figure 25. Pigeon Toed, or Toes Turned In.

The introduction of draft blood in many parts of the country has brought into the market a great many medium-sized horses with large, flat feet, which are almost sure to deteriorate rapidly when put to service on hard roads at any but a slow gait. Horses whose hoofs are naturally small and hard are better prepared to withstand the effects of warm, dry stables, or long marches over rough or dry country. They have less bulk and weight to lift at each step; their action under the saddle is more nimble and pleasant, and the pounding received by the feet is not so apt to be severe, because horses of this class usually travel close to the ground, while horses with large or flat feet generally lift their feet high. A contracted foot should not be mistaken for a naturally small foot.

Some horses toe in—
“pigeon toed”—(figure 25)

Figure 26. Toes Turned Out.

and some turn out their toes (figure 26). Both are objectionable in cavalry horses. Sometimes a horse toes in more with one foot than another, and breaks down first on the one which turns in most. The horse which turns out his toes is apt to “paddle” with his fore feet when in motion; and, with this conformation in front, his hocks are likely to turn in too much (figure 29).

The same remarks as to size and condition of the fore feet are applicable in general to the hind feet. The hind feet are usually more upright than the fore feet, and are much less subject to disease or maldirection. This upright condition should be natural and not due to disease, which exhibits itself sometimes as "cocked ankles" (figure 27).

If the toes of the hind feet show signs of striking the shoes of the front feet, producing, in motion, the sound called "clicking," the horse will not be satisfactory for marches at a trot under a heavy weight.

The Hind Quarters Generally.—The loins should be broad, short and muscular.

Figure 27. Cocked Ankles.

The hips should not be ragged. Ragged hips are not only unsightly, but their prominence may be due to narrowness of the loins. The absence of muscular development of the inner thighs known as "split up behind" is a sign of weakness and very objectionable; the thighs should be deep and well developed, but with sufficient interval between to prevent friction (figure 28).

The stifles should be prominent and well defined; they should lie close to the abdomen, and be slightly deviated outward.

The hocks should be neatly outlined, lean, large, and wide from front to rear.

✓
The leg below the hock should incline but little if at all under the body; if inclined too much the liability to strain on the ligaments and tendons becomes great. If the leg below the hock is nearly vertical, the conformation is favorable to speed, because the foot on arriving on the ground is strongly flexed upon the leg, which gives the hock energetic impulsion, and admits of long strides. If the lower part of the leg be inclined under the body, it not only affects the speed by diminishing the stride, but increases the weight borne by the hind quarters, and causes a considerable part of the muscular effort of impulsion to be expended in lifting the body instead of carrying it directly forward.

The hocks should be viewed from behind with reference to their parallelism to the median plane of the body. The hocks may turn towards one another behind, giving the horse the appearance called "knock-kneed" in men, and "cow-hocked" in the horse (figure 29). If the points of the hocks are turned out the appearance is similar to "bow legs" in man. Both forms are objectionable for many reasons.

Figure 28. Rear View of
"Deadwood."

The Tail.—The dock or solid part of the tail should be large and muscular. The tail should be carried firmly, and well away from the hind quarters. The tail is usually set on much higher and is more ornamental in well-bred than in common horses. The

hair of the former is fine; in the latter it is frequently thick, coarse, or curly (1, 2, 3, figure 30).

When the horse has considerable slope at the croup and his tail is set on low down he is characterized as "goose rumped." Occasionally a satisfactory saddle horse is found with this shape, but unless his conformation, otherwise, is very good, animals of this kind should not be passed by the inspector (3, figure 30).

Upon completion of the examination of a horse have him led, with a loose rein, at a walk on a hard roadbed, and view his action from in front and behind. Repeat this at a trot, viewed as before. Now have a saddle and bridle put on the horse, and note

Figure 29. Cow Hocked.

the disposition of the animal while this is being done. Have a rider mount and gallop the horse, so that he may be viewed as at a walk and trot. It is usual at this time to have the horse galloped fast for several hundred yards to enable the veterinarian to examine his respiration and wind.

In examining the horse in motion it should be observed if his movements at all gaits are regular, free, and natural. The artificial gaits of the trained saddle horse are of no special value to cavalry, for when animals with these gaits are ridden by guides it is impossible to regulate the gaits of other horses by them.

It should be demanded that the horse walk, trot, and gallop without defects or peculiarities of gaits. If the horse is lame in

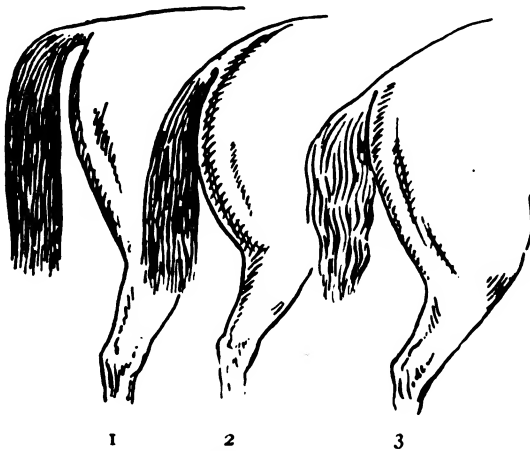


Figure 30.

the slightest degree, even from an apparently fresh and insignificant wound, the examination should be suspended.

It is not to be expected that horses with clearly apparent features of lameness will be presented in that condition for inspection and sale as sound animals. There are many obscure cases of lameness which may not be readily detected during a cursory or careless examination. Lameness not infrequently has an apparent location elsewhere than at the real seat of trouble.

If a lame horse be led by a loose halter strap at a trot, on a hard piece of road, a careful observer will notice as he approaches, passes by, and recedes, a dropping of the body upon one extremity or the other. If the dropping of the head or depressing of the hip takes place at the time the foot of the off (right) side comes to the ground, the horse is lame on the near (left) side. If the dropping of the head or depressing of the hip occurs on the near (left) side, the horse is lame on the off (right) side.

Having determined on which side and whether it is in a fore or hind leg that lameness exists, it still remains to definitely locate the seat and cause of the injury. In some cases there may be no visible alteration of the parts to indicate whether the lameness is in the shoulder, leg, or foot. Heat, flinching from pain, and swelling of the parts are the surest indications of the seat of lameness.

The lameness which an inspector must look out for is where the horse is lame in both fore or both hind legs, particularly the former. If lame in both fore legs, the action of the horse is rather stiff and the steps shorter than natural. This condition generally arises from founder, navicular disease in both feet or contracted heels. If lame in both hind legs, the fore legs are kept back of the normal position, and the head is lowered when the animal is in motion. Backing and turning are accomplished with difficulty.

If the horse throws his feet out of the vertical plane at a walk and trot—usually called “paddling”—or if he interferes sufficiently to cut himself, he should not be accepted. A horse which interferes when in good condition without a load is apt to be worse when thin in flesh and fatigued from packing a heavy weight on the march. The “paddling” movement is not only unsightly, but occasions fatigue and an unnecessary waste of energy.

The entire examination should be made without whips, noise or excitement of any kind. This is difficult to enforce at public stock yards and stables, but should be insisted upon.

Some horses, apparently sound and without vice or fault, will still be far from desirable cavalry horses. If, for instance, a horse appears clumsy, especially at a trot, the inspector should mount him and give him a thorough trial, else he may pass into the ranks an animal whose rough gaits will cause more discontent than he is worth.

Ability to carry flesh under short rations is a very excellent quality in troop horses, for it not only enables them to stand hard work, but saves sore backs, which generally result when loss of flesh destroys the perfect fit of the saddle. This aptitude to take on and retain flesh exists in horses of particular conformation, with which cavalymen soon become familiar in active service.

Disappointment may come because an animal whose form justifies the highest expectations may prove without the courage or ability to perform according to nature's gifts, but there will be some satisfaction in the knowledge that those whose forms indicated unfitness have not been made a burden upon the government.

In examining horses attention will always be called to the fine points, of which most horses possess some. After the eye has become trained, a horse whose defects of detail predominate will at once show a want of harmony of the whole. If, on the other hand, his defects are few, the impression conveyed will be harmonious. It is then only necessary to determine if any of the defects of form are such as to be a source of weakness when the horse is put to the use for which he is to be bought. The most valuable and competent inspector of remounts is the one who can

quickly and correctly decide as to what defects and blemishes may be safely waived.

In all examinations of animals for public service, it should be kept in mind that endurance is limited by the weakest part. While in private life such care may be bestowed upon a horse as to cause a weak member to last as long as the more sound ones this cannot be done in military service.

The preceding pages, while containing many general remarks and principles, are primarily intended to set forth the points and qualities desirable in a cavalry horse.

The artillery horse is a combination of the saddle and the draft horse. The relative proportions of these two opposing characteristics vary depending upon the class of artillery work the horse is to perform. Thus, in siege artillery, when the load is heavy and the gait slow, the draft feature exists almost to the exclusion of the saddle qualities, while at the other end of the list is the horse artillery animal, where the weight being comparatively light, and the gait frequently fast, saddle qualities must exist to a very large extent, though not to the same degree that draft predominates in the siege artillery horse. It should always be borne in mind that the essential qualification in all artillery horses is ability to draw the carriages to which they are harnessed, and that all saddle qualities are subordinate to this. The trot is the harness gait for covering long distances rapidly, and artillery should be able to keep this gait unbroken for several miles.

The characteristics of horses for saddle purposes vary considerably from those for draft. Horses for draft purposes only are much heavier especially in the shoulders, moving the load more by their weight in the collar than by muscular exertion. The shoulders are also broader, affording a good bearing surface for

the collar and they are also straighter (less sloping) in order that the line of draft may be more nearly perpendicular to them. The pasterns are more upright to enable the horse to exert his strength without "digging in his toes"; the neck shorter, heavier; the chest is generally broader; the hind quarters are heavier; the rump is broader; the legs are shorter, and in general the horse is heavier and of more blocky build than the saddle horse.

The grading of artillery horses into lead, swing, and wheel, and attempts to have distinctive weights and sizes for each is now abandoned, it being generally recognized that the best six-horse team is that in which all the horses are nearly alike, and any pair can be placed in any position. This is important for a continuous line of trace from lead to wheel exists, and the nearer all the horses are to the same size, the nearer this line comes to being a straight one. On the other hand, small horses in front of the large ones make a broken line of trace with a constant downward pull on the necks of the larger horses. And again, as wheel horses are always working while in motion, in draft, or holding back down grade, or turning the carriage, it is an advantage to be able to put any one of the three pairs in the wheel so as to equalize the work.

Notwithstanding that there is in all armies, in time of peace, a great demand for mobility in the artillery, and therefore lighter and more active horses are called for, there is a tendency toward heavier horses—horses that can undoubtedly draw the carriages in spite of hard work, bad roads, and small rations.

The description of the exterior of the horse given herein applies to artillery horses also. A more detailed description of the artillery horse is as follows:

The best artillery horses (except siege, which should average from 16 to 16½ hands high, and weight from 1350 to 1400 pounds) are about 15¾ hands, weight about 1200 pounds when in fair condition; in purchasing it should be borne in mind that horses, when sent to market usually have many pounds of fat on them. Horses over this height are not, as a rule, as well proportioned, or else they are of defective conformation for artillery.

Long legged, long barrelled, tucked up belly, "slab sided" (insufficient arch to ribs), narrow chested horses and those with big flat feet are entirely unsuited for artillery. The head should be proportioned in size to the rest of the animal, and never large, coarse, and heavy. The neck should be shorter and heavier than in the cavalry horse. But the neck must not be so wide as to prevent a good bearing surface in the shoulder for the collar, or to be pinched by it. The ewe neck especially should be carefully avoided, as the collar is not held properly in place, and the horse does not carry his head so well as with either a straight or arched neck, and consequently his balance is disturbed.

The shoulder is one of the principal points of difference between saddle and draft horses. This should not be so sloping as to cause the collar to work up and choke the horse, and while, on the other hand, upright, straight shoulders are desired for draft horses only, it should be borne in mind that the artillery horse is also to be ridden, and therefore some slope to the shoulders is necessary. A straight shoulder generally indicates a rough gait. This is undesirable, especially in horse artillery, where the function of the cannoneer's horses being to

carry them to the place where their work (firing) begins, it is essential that they should arrive there fresh and not in a worn out condition due to a hard gaited horse. On the other hand, as the cannoneer's horses have to work in harness in emergencies, they cannot be simply saddle animals, but must possess good draft qualities. The shoulders should therefore slope less than in the cavalry horse, but more than in the common draft horse. They should be heavy, and afford a good bearing surface for the collar.

The chest should be wider than in the cavalry horse and plump in front. It is that of the harness or driving horse rather than that of the saddle animal. The hindquarters should be heavy and well muscled; the rump should be wider and more nearly square (less sloping across the hips) than the cavalry horse. The legs should be shorter, and the muscles of the forearm and gaskin prominent. The distance from the last rib to the point of the hip should be as short as possible. The barrel should be short, measured along the back, but large in circumference. Such horses, as a rule, are easy keepers, and stand hard work well.

It has been the main object in this chapter to call attention to the various forms of horses, and explain* the relative value of different points. It is not always practicable to have the professional assistance of a veterinarian, therefore, cavalry and field artillery officers and quartermasters should be able to make an examination of the horse for soundness without assistance, except as to certain occult forms of disease. The method prescribed herein is in accordance with the best practice of veterinarians, and if closely followed will generally give satisfaction.

EXAMINATION FOR SOUNDNESS.*

1. Examine the animal as he stands in his stall to see if he points either fore foot, or favors any leg. Observe the position of the posterior extremities when standing. Observe whether he cribs or bites the woodwork; holds on to the manger or halter ropes or straps to suck wind; bites or kicks; weaves or moves from side to side like a caged animal; or whether he exhibits any glaring unsoundness forbidding further examination.

2. Lead the animal out into the light, and observe if the pupils of the eyes contract evenly; if not suspect defective vision. Stand in front and compare the eyes, as to whether one is smaller than the other; whether there exist any signs of an operation having been performed; any signs of ophthalmia, white specks in the cornea, torn eyelid, warts, or other abnormal conditions. Wave the hand gently to and fro in front of the eye; if the animal does

* A committee of the American Veterinary Medical Association was appointed to investigate the practicability of establishing a standard of soundness, and submitted a report at the forty-first annual convention in 1904. The chairman reported the inability of the committee to present anything in the way of definite rules for a standard and further adds: "The subject is an exceedingly complicated and difficult one to handle. The old English arbitrary system of either condemning a horse as unsound, or passing him as sound, is certainly extremely harsh and in many instances unjust to the intending purchaser, to the vendor, and to the horse. It is the opinion of the committee that degrees of soundness should be recognized; that is, first absolute soundness, and second, serviceable soundness. It is a very simple matter to define absolute soundness but when it comes to serviceable soundness it is exceedingly difficult, if not an impossibility, to set down any definite rule. In very many instances, when our advice is asked as to the advisability of purchasing an animal, it is not a question of soundness at all but a question as to the usefulness of the animal for the particular purpose intended. The purposes for which horses are bought and used are unlimited, and while a horse may be serviceably sound for one purpose and do excellent work, for another purpose he would be entirely useless."

not instinctively close the eye upon the approach of the hand, proceed carefully to determine whether or not sight has been lost.

3. Examine the ears for cuts and slits made by sticking the head into barbed wire fences. If the ears hang flabbily, or do not move quickly and rigidly at intervals something is wrong; observe carefully the base of the ear and vicinity for sores.

4. Look the horse squarely in the face to see if there is any abnormal or uneven development about the head. Look for evidences of ulcerated teeth, as indicated by swelling in the vicinity of the facial sinuses and of the bones of the lower jaw, and by offensive odors.

5. Open the animal's mouth, and observe if all the teeth, molars as well as incisors, are intact. Examine carefully for parrot mouth, lacerated tongue, abscesses, bit bruises on the bars, and the teeth to determine age.

6. Examine the nostrils for healthy color, polypi, ulcers indicating glanders, and for offensive discharges. Look for farcy buds on the neck and sides of the face. Feel under the jaw for enlargement of the lymphatic gland. Examine the region of the parotid gland for evidences of inflammation. Raise the jugular vein to see if it is intact; observe if any inflammation of the vein exists.

7. Pass the hand from the top of the head along the neck to the withers for evidences of poll evil, bruises, or fistula. Place the ear to the trachea, to observe if the sound of breathing is clear and even.

8. Pass to the near (left) side of the animal and examine the back for sit-fasts, or saddle sores. Observe the shoulder for signs of wasting away of the muscles, enlargement of the joint,

heat, or tenderness. Examine the point of the elbow for capped elbow (figure 31). Examine the near fore leg with the hand, looking at the off leg also, for broken knees, speedy cut, splints (figures 31 and 32), side bones, ring bones, injury from interfering, sand cracks, seedy toe, false quarter, scratches, grease, wind galls, heat about the fetlocks or coronet, and scars from wire fence wounds.

9. Take up the foot and examine for indications of founder, coronet, and scars from wire to see if the bars have been cut away; whether there is any offensive odor of the frog, and to see if there is any peculiarity about the shoe, made necessary by the form of the foot, or the action of the horse. See if there is any appreciable difference in the size or shape of the feet. Examine the tendons for evidences of sprains.

Figure 31. A handsome high spirited troop horse, which in a brief period of service developed broken knee, near leg; splint, off leg, and capped elbow, near leg.

10. Listen to the heart to determine if its beats are regular.

Observe the breathing to determine if the inspirations and expirations are equal. If inspiration is accomplished with one effort, and expiration with two, called "double breathing," the horse is unsound. This may be observed by watching the ab-

domen. Examine the abdomen for hernia. Pass the hand along under the chest and abdomen to feel for cinch sores and shoe bruises occasioned by a faulty method of lying down.

11. Have an attendant hold up a fore foot while an examination

Figure 32. 1. Splint on Near Fore Leg above Fet'lock. 2. Splint Near Fore Leg below Knee.

is made of geldings to see if castration has been properly performed, and that no signs of scirrhus cord exist.

12. Examine the stifle joint, and pass the hand along down the near hind leg to the hock, comparing at the same time the relative size of the hocks ; examine for bone and bog spavin, thoroughpin, capped hock (figure 33), curb (figure 34), and skin disease in

the hollow of the hocks (sallenders). The inside of the thigh should be examined for farcy buds. Examine the lower limb and foot as in the case of the fore leg, except that some injuries of the fore are never found in the hind leg. Pass behind and compare the hips, quarters, and buttocks; feel the tail and observe the anus and vicinity for injury or disease.

13. Proceed to the off (right) side and repeat such part of the examination as may be necessary for that side. Observe during the entire examination whether any parasites are attached to the skin.

14. Go to the horse's head, take hold of the bridle, and back him suddenly; if the tail is elevated and the hind legs do not respond, or the animal should partially sit down, or elevate one of his limbs suddenly, he is unsound. Turn him around suddenly and look for the same symptoms. The horse should be

Figure 33. Capped Hock.

led with a loose rein at a walk, and then at a trot, his action being carefully noted for any inequality of movement, which, if discovered, must be critically examined.

15. Saddle the horse and observe if he gives in the loins when mounted, or shows any signs of weakness.* Have him ridden at a walk, trot, and gallop, and watch for indications of lameness and peculiarities of motion. Have him galloped rapidly, up hill if practicable, and then have him halted suddenly; put the ear close to his nostrils, and listen to his respiration for roaring, whistling, or broken wind, and also observe if respiration subsides promptly to normal or not.

Opinions vary as to whether grunting is an indication of unsoundness, and many practical horsemen believe this trouble changes into roaring. To be on the safe side, regard it as an evidence of unsoundness. To detect it, strike the horse a sharp blow with a whip or stick, and make believe to strike again, when the horse will grunt if affected with the ailment. It may also be detected by halting suddenly from a rapid gait.

Figure 34. Curb-enlargement Back of Leg Below the Hock.

* It is not uncommon to see persons with considerable experience with horses proceed to pinch a horse over the kidneys, and when the animal flinches and gives down, a verdict of weakness in the loins is rendered against him. The case, in fact, is exactly the reverse, for if a horse does not show any sign of flinching, when so pinched, it is very good evidence that something is wrong.

CHAPTER II.

FRAMEWORK OF THE HORSE MECHANICALLY CONSIDERED.

Center of Motion.—Center of Gravity.—Base of Support.—Relative Positions of Centers of Motion and Gravity.—Equilibrium.—Effect of Head and Neck on Center of Gravity.—Artificial Balance of Saddle Horse.

The skeleton forms the basis of the animal machine, and it is necessary to have some understanding of it from a mechanical, as well as anatomical point of view. The principles involved are familiar, relating chiefly to levers and equilibrium, or such a distribution of weight, with reference to its supports, as to insure stability. The principal weight to be carried is the rider and packed saddle.

Looking at the spine, or framework of the back on which the rider's weight is to be carried, it will be seen that the under line of the vertebræ is nearly straight, although not horizontal, since it inclines somewhat downwards towards the forehead. The spinous processes of the first thirteen vertebræ, reckoning from the point where the neck is attached, incline backwards; the fourteenth, fifteenth, and sixteenth are nearly upright, and the remaining dorsal and all the lumbar vertebræ incline forward.

Regarding the entire backbone as an arch, it is evident that the keystone is at the point where the vertebræ stand upright, that is, about the fifteenth, or between the fourteenth and sixteenth. It is obvious that this inclination of the processes towards a central point is intended to and does limit the motion of the back downward and upward, so that the center of motion of the horse's body, the point about which the several movements of the

fore and hind legs are performed with varying degrees of rapidity, lies near the fifteenth vertebræ.*

This is further shown by the distribution and points of attachment of the muscles of the back and adjacent parts of the fore and hind quarters. Putting, therefore, the progressive movement of the animal out of the question, as being equally applicable to

* Considerable discussion having arisen from time to time as to the fourteenth vertebra being the most upright, the author addressed a communication in regard to this point to one of the recognized veterinary authorities in America. The careful consideration given the subject justifies the publication of the reply:

AMERICAN VETERINARY COLLEGE, May 23, 1894.

Captain W. H. Carter:

DEAR SIR.—To answer your letter of the 18th inst. I have made researches which I send you, but which I am afraid will not permit a definite solution of the problem.

The veterinary anatomies that I have consulted do not seem to agree as placing the fourteenth dorsal vertebra in the light presented by Major DWYER's book. For instance, STRANGWAY says that the thirteenth, fourteenth, and fifteenth are nearly upright, and the sixteenth oblique forward. For STEEL, it is the sixteenth. For RIGOT, the sixteenth and seventeenth are about upright. CHAUVEAU and FLEMING says the sixteenth and seventeenth are about upright, the eighteenth bent forward. Others, like PERCIVAL and BLAINE, make no mention of the difference.

Amongst the cuts that I have (Cuyer and Alix, Leisering) the fifteenth seems the most upright.

Out of three skeletons that are in the museum of the college (French and American), two natural and one artificial, the fifteenth is the most upright of all.

Evidently from these, taking an average, it appears that the upright condition of the superior spinous process is more generally admitted as existing in the fifteenth and sixteenth than in the fourteenth.

* * * * *

I remain yours very respectfully,

A. LIAUTARD.

all its parts, the motion of the several parts of the body increases in proportion to their distance from the center of motion.

The same rule is applicable to burdens placed on the horse's back, especially that of the rider, whose frame is also subject to its own peculiar motions, some of which are caused by the progressive movement of the animal.

If the rider be placed over the center of motion, a point equally removed from the four points of support, he will occupy, as it were, the summit or apex of a more or less regular pyramid, and should have greater stability, and be less disturbed by the horse's motion, than if placed at any other point.

The determination of the center of gravity of living bodies, whose parts are of ununiform density, subject to constant displacement by locomotion, change of attitude, and by action of the organs themselves, is a very difficult matter when compared to its determination in bodies of geometrical form and homogeneous construction. The practical value of its determination in the horse lies in the knowledge thereby acquired as to the proper distribution of load in order to retain the normal position of the center of gravity, and thus prevent one set of limbs being used up before the others.

The position of the center of gravity and the distribution of the weight of the body on the legs vary with the conformation of the animal, particularly as to the size and shape of the head and neck. In consequence of the projecting position of these parts, a somewhat greater proportion of its total weight falls on the fore legs than on the hind ones, and causes the forehand to average about one-ninth heavier than the hind.

A great many experiments have been made to determine the exact position of the center of gravity of the horse, and the best authorities agree that it lies at or near the intersection of a vertical line (*AB*, figure 1) passing in rear of the high point of the withers at about the ninth vertebra, and a horizontal line (*EF*)

cutting the lower third of the body from the upper portion. This intersection will generally lie in the median plane of the body.

The usual method of determining the center of gravity is to use two weighing machines, so placed that the anterior extremities rest upon the middle of one, and the posterior extremities upon the middle of the other. By this same method the effect upon the center of gravity is found as the horse raises or lowers his head; when the saddle and load are shifted forward or back; also, when the rider throws his weight into the stirrups, or leans forward, back, or to either side.

It has been stated that the center of motion is situated in a vertical line intersecting the vertebræ at or near the fifteenth (*CD*, figure 1), and the center of gravity on a line intersecting the vertebræ nearer the shoulder (*AB*, figure 1). A horse in a natural state goes with two centers in the relative positions described, and can do so with a rider; the horse can also go, when either trained or weighted, so that the center of gravity falls to the rear of the center of motion, as in certain styles of school riding.

For all general purposes, however, the vertical lines falling through these two centers should be made to coincide; for correct military riding this condition is particularly desirable, owing to the necessity for turning sharp curves at all rates of speed while heavily weighted.

The polygon, formed by lines joining the four points touched by the horse's feet standing at rest, is called the base of support. In motion this base of support becomes sometimes a triangle, at others a line, and finally, as in the run, a mere point.

The equilibrium is of course more stable as the base of support becomes larger, and the line of gravitation nearer the center of the base, and unstable under the contrary conditions. A broad or "square-built" horse will have a condition of stable equilibrium greater than a narrow-chested horse, whose legs are close

to the median plane. Both being at rest, the rectangle forming the base of support in the latter case will fall within the rectangle of the former, the length being the same.

While at rest all the legs are regarded as bearers, but when in motion the fore legs are the bearers, and the hind legs act essentially as propellers. To a certain extent, however, the fore legs assist propulsion, as the hind legs also assist in sustaining the weight.

It is an established fact that race horses are favored in their stride by putting the jockey well forward, and the converse of this is true; that is by weighting back there is a loss of propelling power, owing to the hind legs also becoming bearers. While speed is gained for short distances by adjusting the load forward, it will not do for service because of the rapid breaking down which occurs in the fore legs.

A mounted horse is said to be in equilibrium when he is capable of obeying the hands and legs of the rider without unnecessary effort, and with perfect freedom of the muscular groups the action of which is necessary to produce the desired movements.

What has been shown to be true by actual experiments with live horses on proportion scales, may be illustrated in another way by a simple diagram.

Suppose the head and neck of the horse to occupy the position DA in figure 35; the relative weight would then be represented by the distance from N to I on the line DE , or IN . If the head and neck be lifted to the position DB , the relative weight will be represented by IN' , and if still more elevated to DC by IN'' . The relative overhanging weight of the head and neck is diminished in proportion as their position is brought nearer to that represented by DC , and the further effect of this is to throw the center of gravity of the animal to the rear of its former position; that is, if the center of gravity is at F when the head and neck occupy the position DA , it will be moved to G when the head and

neck are raised to the line DB , and further back to H when the head and neck are raised to the position DC .

A horse's neck is flexible to a certain extent, and the head which forms no inconsiderable portion of the overhanging weight, can be bent at various angles to the neck. It is therefore practicable to diminish the preponderance of these members by altering their relative position as described above, and to diminish the distance at which the perpendicular falls outside the line DE , by bending the neck, and also by causing the head to assume an acute angle with the neck, whether the latter be straight or curved.

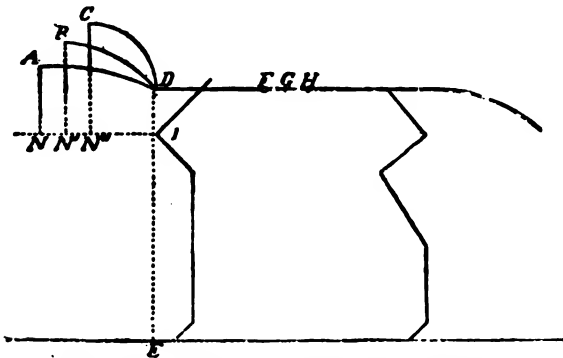


Figure 35. Diagram: Equilibrium of Horse.

The application of this knowledge renders it possible, in connection with proper biting and saddling, to train cavalry horses to maintain their equilibrium at all gaits while carrying on their backs the heavy weight of trooper and pack, which combined equals about one-fourth the weight of the animal.

In the foregoing the movement of the center of gravity has been considered only in a vertical plane. It also has a marked horizontal motion, its oscillations to the right and left at a walk and trot being quite regular, and constantly traveling in the direction of the fore foot which is about to support the weight.

In riding on curves, as in the riding-school, the horse and rider both lean toward the inside to bring the center of gravity in that direction, otherwise the animal would lose his balance and fall. As a matter of fact the horse not only leans toward the inner side of the curve, but also turns his head in the same direction.

It has been shown that the center of gravity lies somewhat nearer the shoulders than the center of motion. It is a very natural question, therefore, as to whether the load should be adjusted so as to leave the center of gravity where nature placed it, or to move it further back.

That the horse instinctively changes the location of this center himself is shown in the way a loose horse travels. Horses on the range moving along at a walk almost invariably hang their heads down slightly, and on a march they do the same thing. When they strike into a trot every head will go up at once. If anything causes the herd to break into a gallop, so long as they remain at a canter their heads will continue as at a trot, but as soon as the stride becomes lengthened into a fast gallop or run, the heads will be straightened out and lowered again. Either straightening out or lowering the head brings forward the center of gravity.

If there were no other conditions to be met than those involving progress in a forward direction, no reason would exist for any alteration of the horse's natural balance; but there are many things which have to be taken into consideration which influence the fixing of an artificial balance of the saddle animal, particularly the cavalry horse.

It is necessary to establish the horse in such equilibrium that he may execute all the movements of drill with promptness and accuracy, and with a minimum of fatigue to himself and rider. This involves quick turns without decreasing the gait, which latter the horse in nature nearly always does. To use a saber on horseback it is necessary to have the horse balanced more with a view to quick turns on the hind rather than the forehand.

One reason exists for throwing the balance of the horse somewhat to the rear, which alone makes it expedient to do so. This is the necessity for preventing the fore feet and legs from becoming prematurely ruined. It is not a matter of theory merely, but a well-known result of actual experience, that horses carrying weights upon their backs become broken down in front, as a rule, long before they suffer any deterioration of the hind legs. The date of breaking down is much hastened by saddling far forward over the withers, and by an improper use of the stirrups, which will be explained later.

After General Sheridan's raid with the Cavalry Corps to Richmond, an expedition of about thirty days' duration, the unserviceable and broken down horses were gathered together in a park at City Point, to the number of about 6000. A careful inspection of these animals showed that while they were remarkably free from bruised withers and sore backs, they were all thin, and a large proportion broken down in front.

CHAPTER III.

GAITS OF THE HORSE.

Motion Implies Displacement of Center of Gravity.—Natural Gaits.—Stride and Step.—The Walk.—The Trot.—The Hand Gallop or Canter.—The Fast Gallop or Run; True, False, Disconnected.—The Jump.

The analysis of the gaits of the horse is a science of itself, into the domain of which the average officer does not care to enter. A brief study of the subject will be sufficient to enable the student of hippology to understand why a trained saddle horse is safer and much more pleasant to ride than the sprawling young colt which has not yet been established in his gaits or carriage.

The movement of the horse's body over the ground implies displacement of the center of gravity, which compels the legs to form new bases of support. The more unstable the equilibrium at any gait, the quicker will the new base of support have to be formed, and the greater the speed for that particular gait. Any excess of muscle beyond that required for the due working of the limbs is an impediment rather than an aid to speed.

There are four natural gaits, the walk, amble, trot, and gallop; and several artificial gaits, being more or less variations of the natural gaits. Amongst these may be mentioned the fox trot; the running walk, a cross between the walk and trot; and the single foot, distinguished by the posterior limbs moving in the order of the fast walk and the anterior ones in that of a trot, being an irregular gait, the characteristic rhythm of the footfall of which, once learned, will be easily recognized, even in the dark.

Marches, drills, and maneuvers are performed at varying degrees of speed, but the only authorized and desirable gaits are the walk, trot, and gallop. Especially should officers' horses be trained to perform those gaits at the regulation rate of speed per

mile. Nothing else is so trying to the temper of, or so productive of discomfort to the men in ranks, as an officer leading the column on a horse with a running walk instead of a square walk, or a single foot instead of a trot.

It may be remarked that in the analysis of the gaits it will be found that no two animals will show the same imprints at any particular gait, and the same horse even will be found to vary greatly in a few strides. By stride is understood the distance from the print of one foot to the print of the same foot when it next comes to the ground, in its regular order of succession, in contradistinction to step which relates to the forward or backward movement of one limb only.

These modifications depend entirely upon the conditions under which the animal is placed, for the horse instinctively alters the position of his supports to accommodate his equilibrium, which may be slightly but continually varied by his rider. This is especially noticeable in the line of footprints made at a fast gallop or run. In this case the horse is supported by one limb at a time, and it is essential that the variations of the center of gravity from side to side should be promptly met by corresponding variations of the points of support, as well as the variations in a forward direction.

In figure 36 the dark shoes represent the prints of the hind feet. *A*, *B*, and *C* represent the trails made by three good cavalry horses taken from the troop stable, and walked over a prepared track. *D* and *E* are trails drawn on the same scale, to illustrate the superposed imprints, and the case of a horse which steps short with his hind feet.

A' and *C'* are the trails made at a trot by the horses used for *A* and *C*.

A'' and *C''* are the trails made at a gallop by the same horses, and *A'''* is the trail made at a fast gallop by the same horse used for *A*, *A'*, and *A''*.

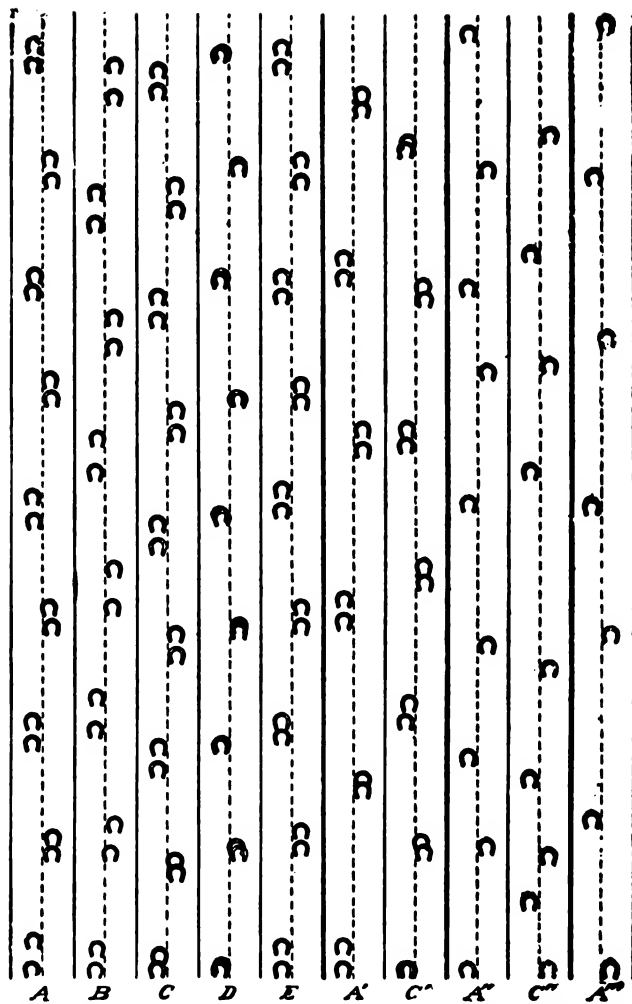


Figure 36. Trails of Troop Horses; Walk, Trot, and Gallop.

When the horse started over *C*" the track was wet near the end, which caused him to take short steps.

The Walk.—This above all others is the cavalry gait, since the heavy weight of trooper and pack necessitates its use on the march to a far greater extent than all the other gaits combined. Unfortunately it is not practicable to determine the ability of the horse as a walker by his conformation. The walk of most horses is improved by service in the ranks.

A good walk is characterized by a high rather than low carriage of the head. The fore legs should be carried forward freely and directly, without undue elevation of the knees. The hind legs should act in planes parallel to those in which the fore legs move. The hoofs should be planted squarely, and remain in place without rotating inward or outward. The prints of the hind feet, should appear on the ground in front of those of the fore feet, and the intervals between them on one side should be the same as on the other. External influences operate in this connection, however, for the prints of the hind feet will sometimes be found superposed upon those of the fore, and at other times to fall behind them (*A, B, C, D, and E, figure 36*).

The walk is a gait of four flat beats, each foot being planted in regular order. If the right fore foot comes first to the ground, the left hind foot is next planted; then the left fore foot, and finally the right hind foot. During this movement the weight is borne first by the two fore feet and the right hind foot; then by the right fore foot and the right hind foot; then by the two hind feet and the right fore foot; and lastly by the left fore foot and the right hind foot.

The center of gravity always falls near the intersection of the lines connecting the diagonal feet, but within the triangle connecting the three feet furnishing support.

If the horse be collected between the hand and heels of its rider, the movement that results is the safest of all. The horse has never less than two, and never more than three feet, bearing the

weight at the same time. When he quickens his movement he does not at once change his gait, but extends his strides, and makes them more uniform until further extension becomes difficult, when he will break into a trot.

The Trot.—In the trot the footfalls mark two sharp beats, and the horse springs from one pair of diagonally disposed legs to the other pair, and is entirely free from the ground between each step, except in the short trot. If the trot depends simply upon this united action of a fore leg and its diagonal hind leg, the pace may be very slow, but if the speed be such that the stride is too long for the fore feet to remain upon the ground together, the true trot results, and the horse goes into the air from each pair of diagonal bearers alternately. The jog trot is a hybrid gait, and is not performed this way.

The trot differs from a walk, in that the horse has always two feet upon the ground at a walk, while at the trot there is always a space of time in which all the feet are off the ground.

The weight is borne by the diagonally disposed limbs alternately, and the step being supposed to be a constant quantity in the fast trot, the stride can be extended only by increasing the space which the body passes over with its center of gravity unsupported. In the ordinary trot this distance is small, but in the fast trot it exceeds that in which the body is supported.

In the ordinary trot the imprints of the hind feet are superposed upon those of the fore feet, but many horses, especially young and untrained ones, bring their hind feet more or less ahead of the prints of the fore feet. This is easily seen by hoof-marks on moist ground (*A'* and *C'*, figure 36).

There are other horses that instead of overstepping, come short of the track of the fore feet with the hind ones. Those that overstep will usually be found to be such as are overweighted on the forehand, whilst those that step short are usually such as are overweighted behind or that have some weakness or other defect in their hind quarters.

While the trot is not designed by nature to be the fastest gait, it is the one in which the average horse is capable of traveling farther in a day's journey, with less fatigue, than any other. It is now adopted as the maneuvering gait for cavalry, and has grown much in favor as a marching gait, for the reason that, when not too heavily weighted, the horse completes the march in a shorter time, is then entirely relieved of his load, and given more time for rest and feeding.

A moderate trot should be less fatiguing to horses than any other gait on account of the diagonal pairs of legs being used as bearers and propellers alternately. Some horses will, however, when ridden, break into a canter, because the alternate shifting of their own and the rider's weight from right to left becomes, with their particular conformation, more fatiguing than the constant use of each pair of legs for the same purpose.

Horses overweighted on the forehand and hurried in a trot, being unable to support the weight thrown more and more rapidly on their fore legs, break into a canter or gallop.

Hand Gallop or Canter.—The difference between the canter and the fast gallop, or running gait, is sufficient to cause them to be mentioned separately. The canter is a gait in which if the weight is received upon the left hind foot, it next falls upon the right hind and left fore, and then upon the right fore foot. It is a gait of three beats, inasmuch as the second period of contact is marked by the diagonally opposite hind and fore feet coming down together.

The trail made by the horse at this gait is entirely different from that at the fast gallop or run, but in passing from one to the other the rider does not perceive any disunited or violent action akin to that which takes place in passing from a trot to a gallop, and the reverse. The horse simply extends himself, gradually if not urged, and passes imperceptibly to the gait in which a diagonal pair of feet no longer come down together, and

which will be described as the gallop. The horse leads with a fore leg, which does not act with the diagonal hind leg.

The Fast Gallop or Run.—This is the most rapid of gaits, and is taken when the propulsion from the hind quarters becomes so vigorous as to shift the center of gravity, and prevent the balance necessary for the performance of any of the other gaits. It has heretofore been the least understood of all the gaits as evidenced by all old pictures of horses in rapid motion.

The most perfect method of quadrupedal locomotion is that in which the greatest speed is attained with the least expenditure of vital force. This is found in the horse in which the deviation of the line of motion from the horizontal is least. Perfect locomotion requires uniform support to the center of gravity and continuous propulsion. The fast run more nearly fulfills these conditions than any other gait.

The imprints left upon the ground by a running horse follow each other very nearly in a straight line. This indicates a minimum size in a transverse direction, of the base of support, and consequently great instability, as well as speed (*A''*, *C''*, and *A'''*, figure 36).

The drawings (figure 37), introduced to show the action of the horse in performing the galloping stride, are from the MUYBRIDGE photographs.

The center of gravity is supposed to be under the saddle. 1 of the drawings represents the rider and horse ready to start. The horse goes into the air from a fore foot (2, 3, and 4); receives the weight upon the diagonal hind foot (5 and 6); then plants the other hind foot (7); then taking the weight upon the latter, extends himself and plants the diagonal fore foot (8); takes the weight upon the latter (9 and 10), and then plants the other fore foot (11 and 12), which then alone sustains the weight until the center of gravity passes over it, when the horse again goes into the air, to alight upon the diagonal hind foot, planted in front of the spot just vacated by the last mentioned fore foot.

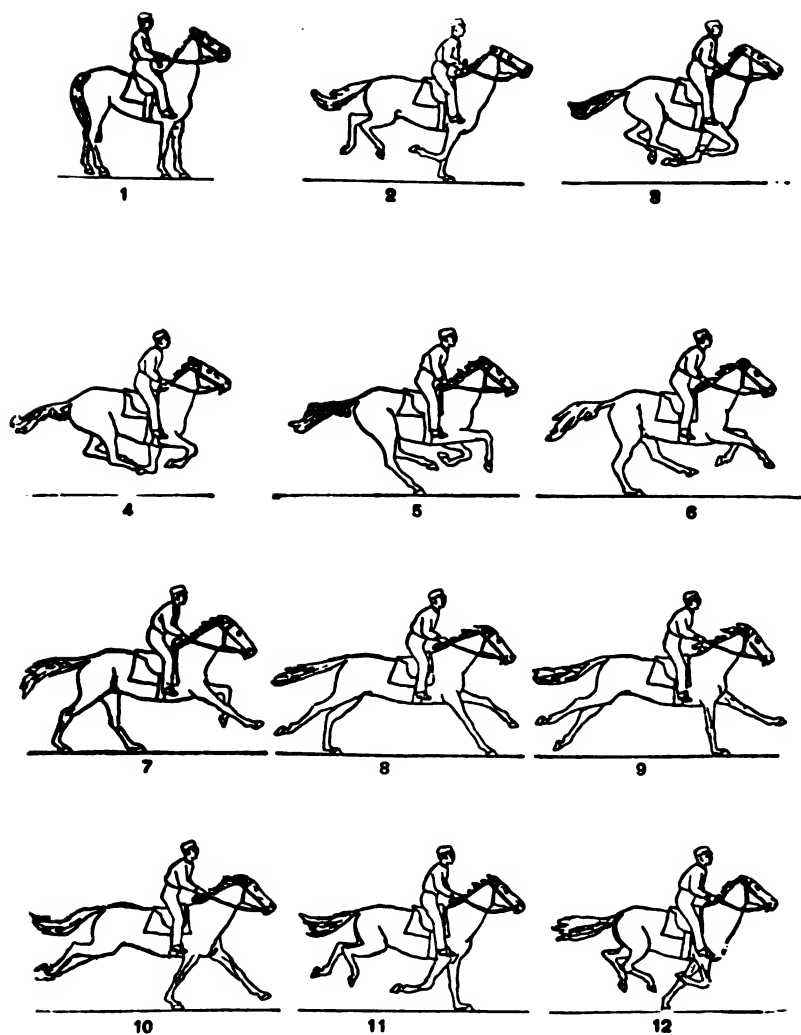


Figure 37. The Galloping Stride.

When a horse goes into the air from his near (left) fore leg, followed in the succession shown in figure 37, he is said to be leading with the near (left) fore leg. When he goes into the air from his off (right) fore leg, followed by the other legs in the corresponding order of succession, he is said to be leading with his off (right) fore leg.

When a horse leads with his near (left) fore leg and is galloping true he is said to execute gallop left; when he leads with his off (right) fore leg under similar conditions he is said to gallop right.

The gallop is called true when the horse leads with the right foot in turning to the right. It is called false under contrary conditions, that is, when the horse gallops to the right on a curve while leading with his left fore foot.

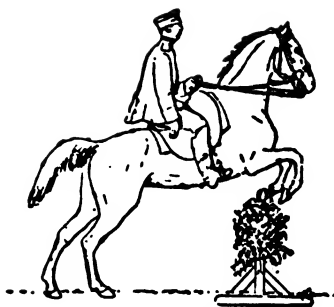
So long as the horse goes upon a straight course it matters little whether the gallop is effected upon one foot or the other, although the horse often takes advantage of a slackening in his speed to change the order of succession of his feet, most probably to ease a fatigued member.

It is quite different, however, when the course is curvilinear. A centrifugal force is developed, which increases with the velocity of the gait and the curvature of the track. The horse is therefore obliged to incline himself towards the inner side of the trail to counteract this force. In view of a fall, which is always imminent, he must steady his equilibrium on that side by the foothold of the corresponding propelling member; the right if the course turn to the right, the left if it turn to the left.

The gallop is disunited when the horse leads with his fore feet in an inverse manner to the movement of his hind feet; that is, if he gallops to the right with his fore feet, his hind feet will move as if he were galloping to the left. The right fore foot would lead, and the left hind be the last to leave the ground, whereas in the united gallop, if the right fore foot leads, the right hind should be the last to leave the ground.



Preparation.



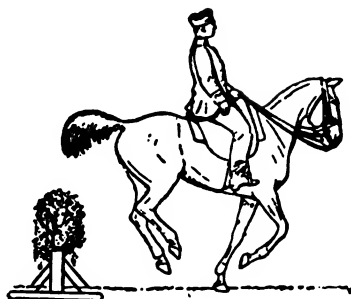
Impulsion.



Passing the Obstacle.



Descent in front.



Descent behind.

Figure 38. The Jump.

The horse gallops disunited with great difficulty. It usually occurs when the horse tries to effect a change of lead, and is suddenly interfered with. It causes much discomfort to the rider, and cannot be continued by the horse for any length of time.

In consequence of the regular alternation of the members at a walk and trot, the work performed by each diagonal pair is identical, but in the gallop this is not the case. In galloping to the right, the right fore and hind legs in turn support the body for a longer period than the legs of the other side. The hind leg on which the body falls has to sustain more than the fore leg, which supports it only before the phase of projection. It follows, that in order to distribute the work equally upon the horse's legs, a change of lead from time to time should be effected.

The fatigue of the horse at any gait will depend very much upon the movement of his center of gravity. If this center varies but little from a horizontal line the strength is not expended as rapidly as when there is great variation, for the same amount of lifting is not required. In the first case the horse goes level, with great freedom of action, and should produce little fatigue to himself or rider. In the second case, the rider being lifted vertically through a considerable distance at every stride, the gait is not smooth; the connection between horse and rider is not closely maintained, and the horse is characterized as "rough."

If the horse be urged at any gait to continually extend himself beyond his ordinary capacity, it will be more fatiguing to him than if permitted to take the next faster gait.

The Jump.—Although leaping is a mode of progression, it is not a continuous one, and cannot be properly considered a gait. All quadrupeds in a wild state acquire a knowledge of jumping as a matter of necessity, but the horse of civilization, especially when carrying a rider, requires considerable training and good handling in order to enable him to surmount difficult obstacles.

Some horses can jump while at a trot, or even from a standing position, but the majority of horses can perform satisfactorily only at a gallop sufficiently slow to enable the animal to measure the height of the obstruction or length of the leap he is expected to make.

Approaching an obstruction at a run (figure 38), the horse betrays anxiety by shortening his steps, advancing with both hind feet nearly simultaneously, until sufficiently near to take off. He then brings his hind feet well under the center of gravity, and instantly the fore leg on the ground is propelled upward to raise the forehand, and this action is immediately followed by energetic propulsion of the hind legs, sufficient to lift the weight to the height required, not only to surmount the obstacle, but to carry the long body of the horse entirely over.

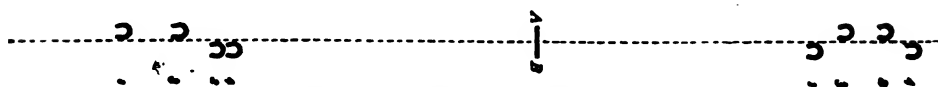


Figure 39. Trail of the Jump.

The hind extremities from the extreme of tension on leaving the ground, pass to the opposite extreme of flexion as they go over the obstacle, and both fore and both hind as they pass are so nearly in unison that they appear together in pairs. After passing the obstacle the fore legs separate, in order not to make contact with the ground at the same time. One of the fore legs is extended to check the force of the descent, which, from the loss of horizontal motion, has little more than the momentum of gravity to deal with. This is the instant of great danger to the pastern joint and flexor tendons; but before these parts are put to the extreme test the other fore leg comes to the relief of its fellow, and immediately after the hind extremities, one after the other, are planted under the center of gravity, and by their great lifting force relieve the fore legs. All the legs are now free to act their various parts in the gallop as before the jump.

The trail made by the horse in leaping the hedge is shown in figure 39.

Figure 40 is an unusually good illustration of the flying jump by Mr. Holloway's "Chappie," at Chevy Chase, Md., Septem-



Figure 40. "Chappie" jumping the bars at 5' 8" in height and covering 25' horizontally.

ber, 1897, over bars 5' 8" high, and covering a horizontal distance of 25 feet. The record for high jumping has been held for some years by horses which have, in turn, cleared the bars at heights considerably over seven feet.

CHAPTER IV.

BITS.

Classified as Bar, Snaffle and Curb.—The Mouthing; Pelham.—Bit and Bridoon.—Horse's Mouth Structurally Considered: Curb Groove; Tongue Channel; Bars.—Temperament of Mouth: Normal; Tender; Hard; Spoiled.—Dimensions Considered in Fitting Curb Bits; Width of Mouth; Width of Tongue Channel; Height of Bars; Mouth Gauge and Trial Bit.—The Curb Bit: Proportions of Upper and Lower Branches; Falling Through; Standing Stiff; The Curb Chain.—Form and Proportions of Mouth-Piece.—American, British and European Cavalry Bits.

There is an endless variety of bits, many of which having been successfully designed to meet the wants of particular cases, are subsequently advertised as panaceas for all forms of restiveness arising from bad biting. Such articles have a period of popularity more or less brief, and are then cast aside for some later innovation, which, probably like its predecessor, contains none of the essential elements of a good bit.

For the purpose of discussion, bits may be arranged under three general classes:

First. Bar bits, or bits with solid mouth-pieces without lever action, and in which a minimum of pressure on the bars of the horse's mouth, and a maximum on the tongue, are obtained. This is the lightest form of bit, and is used on driving rather than saddle horses.

Second. Snaffle bits, or those with jointed mouth-pieces, without lever action but with a slight pincer action.

Third. Curb bits, or those in which lever action is obtained by means of cheek-pieces, and a curb chain, acting on the chin, to increase the amount of pressure brought to bear upon the bars of the horse's mouth by a pull on the reins.

Bar bits are usually made with a straight or very slightly curved mouth-piece, with a medium-sized ring at either end, and some-

times with half-cheek pieces (No. 1, figure 41). They are sometimes made with cheek-pieces similar to those of curb bits (No. 2, figure 41), but when the reins are attached to the lower branches and no curb chains or straps are used, the pressure on the bars is not increased, but rather diminished, since some of it is transferred through the cheek straps to the top of the head, or poll. Many of the driving bits have the mouth-pieces covered with rubber; a chain bit so covered is shown with part of the rubber removed in No. 3, figure 41.

The common smooth snaffle bit with one joint (No. 5, figure 41), is the most useful of all bits. For the saddle horse it should be of the simplest form, neither too long, too thin, nor too much curved, and each half should be tapered down from the outside to the middle.

Snaffle bits are often made with rings only; the cheek-pieces being omitted. They are sometimes made with a double-jointed mouth-piece (No. 4, figure 41), and occasionally with two mouth-pieces, plain or twisted, the joint of one being on the opposite side of the center from the other (No. 7, figure 41). Then there is the single-twisted wire snaffle bit, a very efficacious instrument for ruining the horse's mouth (No. 6, figure 41); and still another contrivance called a bit, but in reality two rings connected by a chain (No. 12, figure 41).

The mouthing bit (No. 8, figure 41) is intended for use on young colts during the first period of training. The mouth-piece is very large at the outer ends, with a gradual tapering to the ring joint, to which are attached three small metal tags suspended on a thin plate. The mouth-piece being thick near the guards, is not apt to wound the tender bars and lips of the young horse. The tags hang upon and tickle the tongue, and cause the colt to champ the bit, as it is called, and tend to keep his mind occupied while he is undergoing the process of being familiarized with strange sights and sounds. This bit is made with full cheek-

Figure 41. Varieties of Bits.

pieces, to prevent the rings from being drawn into the mouth. Upon the gentle application of this and the plain snaffle to the colt's mouth, much of the future usefulness of the mature horse depends.

The snaffle bit, called bridoon, which is used in combination with a curb bit, has a mouth-piece of smaller diameter than is generally the case where the snaffle bit is used alone and usually has small rings, with no cheek-pieces, at the outer ends.

Curb bits are made in a multiplicity of shapes, but each bit consists primarily of a solid mouth-piece connecting two cheek-pieces. The upper branches of the cheek-pieces are always straight, but the lower branches may be straight, single or double curved. The mouth-piece is usually joined solidly to each cheek-piece, but some curb bits are arranged to permit of a slight play of the mouth-piece up and down on the cheek-pieces. The mouth-piece may in its lightest form be straight or it may be curved throughout. The common form of mouth-piece has an upward curve or tongue port at the center. When a curb chain is attached and there is no pull on the reins, the port rests on the tongue. When a pull on the reins is exerted the port revolves upward and forward, and the parts of the mouth-piece embraced between the cheek-pieces and the port are forced against the bars of the horse's jaws. The mechanical action of the bit is that of a lever of the second order. The upper ends of the cheek-pieces being held by the curb chain, acting against the back of the jaw bone, and the power being applied at the lower ends of the cheek-pieces by a pull on the reins, the force exerted against the bars of the jaw represents the weight.

A curb bit with straight cheeks and a similar bit with square top port and lip strap rings are shown in Nos. 9 and 10, figure 41.

The lip strap rings are set in the back part of the lower branches of the cheek-pieces and are used for the attachment of a small strap or string, which passes up to a ring at the rear and center of the curb chain. The object of the lip strap is to prevent the

horse from putting his lip outside either of the lower branches of the cheek-pieces and from turning over the curb bit, by throwing up his head.

There is a hybrid bit, called Pelham, used both for driving and riding, which has the cheek-pieces of the curb bit and a mouth-piece jointed, either like a common snaffle bit or like a pair of compasses. This bit is called the compass canon in books of two hundred years ago on the horse.* It is supposed to possess the virtues of the curb bit without all its severity. As it is provided with guard rings, it can be used either as a snaffle or curb bit. Riding Pelhams are very good bits but the action is far inferior to that of the ordinary curb and snaffle bits, used in combination as "bit and bridoon." A driving Pelham bit is shown in No. 11, figure 41. It has the cheek-pieces of the curb bit with a jointed snaffle mouth-piece, and it is used with curb chain or strap.

The upper branches of some curb bits are made double on each side, the upper branch proper carrying the curb chain or strap, and the other being attached to the cheek pieces of the bridle. A pull on the reins acts to tighten the curb directly, without any pressure on the top of the head. This is provided for by the swivel motion of the upper branches.

There are some important points relating to the horse's mouth which should be understood in connection with the consideration of bits.

The lower lip of the horse is covered with a very thick skin, underneath which lie the roots of the beard, fat and membrane, and this structure is continued up into a depression under the chin, known as the *chin groove*, or curb groove. The portion of bone immediately beneath the thick, and not very sensitive, skin

* During the autumn of 1900 an excavation was made at the site of "Jamestown" to uncover the ruins of what is believed to have been the first tavern in Virginia. Amongst other implements found in one of the rooms was a "Pelham" bit now in the possession of the author. Jamestown was destroyed by fire in 1676.

of the chin groove, being the point where the two branches of the jaw begin to unite together, is flat and rounded off in all directions. If a flat curb chain, or strap which has a proper width, act in this groove, a considerable amount of pressure may be applied there without causing any pain to the horse.

Immediately above this groove the character of the bone and that of the skin covering it are very much changed; the former has sharp edges, and the latter is very thin and sensitive, so that a slight pressure of this thin skin on the sharp edges of bone causes very considerable pain. These peculiarities should be borne in mind in order to properly bit a horse, for pieces of the bone are sometimes broken off and cause suppuration for long periods.

The lower jaw of the horse consists of two cheek bones, whose branches form a groove or channel in which the animal's tongue lies. Those parts of the jaw on either side devoid of teeth, except the tusks, are called the bars, and it is somewhere upon them that the bit must be placed. So far as the bars are concerned, the location of the bit could be varied an inch or more; this variation, however, is limited on account of the necessity for placing the bit opposite the chin groove.

It is self-evident that horses' mouths are not all alike; therefore each individual horse requires a bit adapted to the particular dimensions and temperament of its mouth.

The bit, by its pressure, more or less severe, on the bars and chin, causes pain of variable intensity. The temperament of the mouth is judged by the reaction in consequence of this pain.

The mouth is *normal* when it supports the bit with freedom, without uneasiness or fear; when it neither resists nor yields too easily to the action of the hand.

The mouth is *tender* when it perceives the most delicate impressions of the hand.

The mouth is *hard* when it yields only to an energetic pull on the reins.

A *spoiled* mouth is one which reacts falsely to the indications of the bit, whatever may be its sensibility otherwise. Horses with very tender mouths or mouths rendered excessively callous by bad biting and indifferent riders usually come under this class.

Aside from the effects produced by variations of temperament in the horse, it is the bars that must be examined for an explanation of these varieties of mouth, for it is upon these more or less sensitive gums that the action of all bits fall to a greater or less extent.

While there is great uniformity in the absolute height of the bars, there is on the other hand a very great diversity in their shape and texture. Some are sharp, fine, firm and sensitive; others are broad, flat-topped, coarse and devoid of much feeling. The former usually characterize tender and the latter hard-mouthed horses.

As a rule well-bred horses have the first, and common horses have the second kind of bars, but it does not follow that the former all have tender and the latter hard mouths, for much depends upon individual sensibility. The first is usually found in combination with a thin tongue which just fills the channel, thus permitting the mouth-piece to exercise its proper action on the bars. The second, on the contrary, is generally found with a coarse thick tongue, which more than fills the channel, often protruding so high as to take much of the pressure off the bars.

There are three dimensions of the interior of the horse's mouth, which should be ascertained before attempting to fit him accurately with a proper bit, namely:

First. The transversal width of the mouth from outside to outside of the lips, measured at the height of the chin groove.

Second. The width of the channel or groove in which the tongue lies, or the distance between the two bars.

Third. The height of the bars, or the distance between two straight edges, one placed across the bars under the tongue, and the other parallel to it, and tangent to the curb groove.

The first measures the length of the mouth-piece of the curb bit, which should fit exactly. If the mouth-piece is too short the lips are subject to injury, and if too long it slips from side to side, and allows the corners of the port to come against and bruise the bars. The width of the mouth is a very variable quantity, depending much upon the breed, as well as the size of the horse. It varies from about three and a half to five and a half inches; the larger dimension is seldom found in good saddle horses.

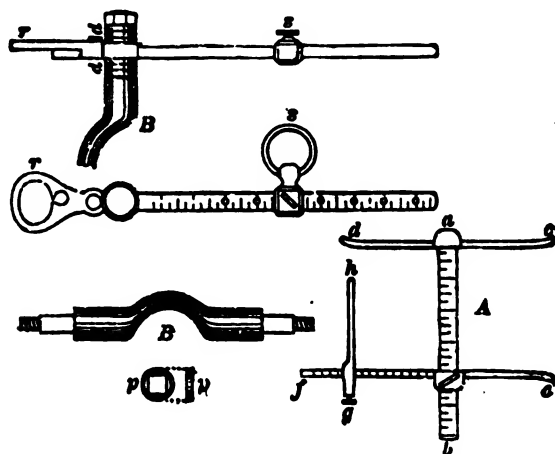


Figure 42. Mouth gauge and trial bit.

The second, which is the width of the tongue channel, determines how much of the mouth-piece of the curb bit must be allowed for the width of the port, the remainder being reserved for the action on the bars.

The third, which is termed the height of the bars, is important, because all the dimensions of the curb bit are usually proportional to it. The height of the bars has been found to be quite uniform in all horses, being about one and three-fourths inches.

A mouth gauge for ascertaining the dimensions of the horse's mouth is made of steel, and consists of a bar, *ab* (A, figure 42), about six inches long, fitted on one side at right angles with a fixed cheek-piece *cd*, and having on the other side a sliding cheek-piece *ef*, fitted with a screw for fixing it where required. The bar *ab* is made oval in the transverse section, with the greater axis about one inch, in order to displace the lips nearly as the mouth-piece does, and is usually graduated throughout.

If this gauge be placed in the horse's mouth like a bit, with the bar *ab* at exactly the proper place for the bit, opposite the chin groove, the fixed cheek-piece *cd* being then held gently up to the off side of the mouth, the operator facing the horse's forehead, the sliding cheek-piece *ef* may be shoved up close enough to the cheek, at the near side, not to displace the lips, and then fixed with the screw. Removing the gauge, the proper dimension for the width of the mouth-piece may be read off the scale on *ab*.

The instrument is also fitted with a rod *gh*, which slides up and down the movable cheek-piece *ef*, which is graduated into inches and eighths or tenths on its lower limb. This contrivance enables the measurement of the height of the bars to be taken. The instrument, adjusted to the proper width of the horse's mouth, is placed as before, with the bar *ab* exactly opposite the chin groove, but underneath the tongue, and is then wheeled around on its own axis until the upper limbs of the cheek-pieces stand nearly perpendicular to the general line of the horse's face. This brings the lower limbs in the opposite direction towards the neck, and the rod *gh* is then shoved up until it presses lightly into the chin groove, taking care that the gauge stands square, and that the mouth-piece lies equally on both bars of the mouth. The rod *gh* is then screwed fast whilst the cheek-piece *ef* is loosened altogether, so that the latter may be removed without disturbing the rod *gh*; the height of the bar may then be read off on the lower limb of *ef*.

A trial bit is also shown. (B, figure 42.) This consists of two cheek-pieces into which may be fitted in succession spare mouth-pieces, the width being varied by the adjustment of a number of small plates *pp*, one-tenth of an inch in thickness, removable at will from the inside to the outside of the cheek-piece. Having the width of the mouth, and obtaining the height of the bars by means of the mouth gauge, the sliding ring pieces *rr* may be shifted until the upper cheek-piece has the required length. There only remains now to slide the rein ring *ss* up or down until the proper proportional length of the lower cheek has been obtained. The curb hooks and headstall may now be attached and the horse tried with the bit. If the adjustment is correct, and he takes to the bit readily, it is only necessary to read off the dimensions and have one constructed accordingly.

There is no lever action with a snaffle bit. There is a slight pincer action but the power applied to the reins is conveyed unaltered in quantity directly to the bars of the horse's mouth.

In the curb bit the mechanical advantage of lever action is obtained, but it will depend on the manner in which the bit and curb chain are arranged, whether or not the lever action obtained is favorable or the contrary. *If the curb chain pinches and causes more pain to the surface of the chin groove than is caused on the bars by the mouth-piece, the horse will poke his nose forward and fret. If the amount of pain on the bars is greater than that on the chin, the horse's head will follow the rider's hand.*

It is quite possible to adjust curb bits so as to get sufficient power on the bars without undue pain on the chin groove; in this way comparatively mild bits are made sufficiently reliable in their action to insure efficiency, with a minimum of discomfort to the horse. After being properly trained the horse usually obeys the rider's indications without requiring much, if any, application of painful pressure on the bars.

The important points to be determined regarding the curb bit are the lengths of the cheek-pieces and the relative proportions of the upper and lower branches. The height of the bars, or one and three-fourths inches for all but exceptionally large horses, has been adopted as the distance from the *center of the mouth-*

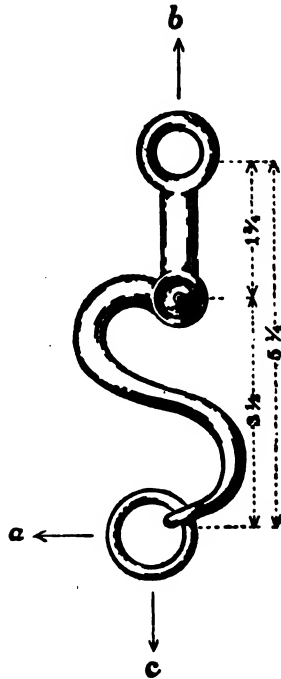


Figure 43. Double curved cheek-piece, with dimensions of upper and lower branches proportioned with a view to producing the mildest form of curb bit.

piece rivet to the point of the upper branch where the curb chain hook is attached. If the top of the upper branch is formed into a ring, which is the ordinary method, the curb chain hook will be near the lowest point of the ring.

The lower branch of the cheek-piece *measured from the center of the mouth-piece rivet to the center of the lower ring*, should be, for the mildest form of curb bit, twice as long as the portion of the upper branch, included between the center of the mouth-piece rivet and the point of attachment of the curb chain hook (figure 43).

These dimensions should not be greatly varied whenever the curb bit is used alone. When both curb and snaffle (bit and bridoon) are used the lower branch of the curb bit may exceed in length the proportions previously prescribed.

The angle at which the reins act on the bit is a matter of importance. In the case of a lever, the action is most favorable when the power is applied at a right angle. If the bit (figure 43) were pulled in the direction of *c* it would have no other effect than to pull it downwards and out of the horse's mouth, unless prevented by the headstall. If the pull were made in the direction *b*, it would only lift the bit up till the angles of the mouth stopped it. In neither case would there be the slightest lever action. It is therefore evident that the direction *a*, which is equally remote from both, must be the most efficient, and this is precisely at a right angle to the lever.

If a curb bit is put into a horse's mouth without attaching a curb chain or strap to it, and the reins are pulled the bit will turn around, and its cheek-pieces come to lie in the same line as the reins. There is no lever action whatever, because there is no prop or fulcrum. The same thing will partially happen with a very loose curb chain or strap. The bit is then said to "fall through."

The opposite fault to this is when the bit "stands stiff," without any play, the slightest pull on the reins causing the horse pain externally, or just in the wrong place. This stiffness is usually produced by a tight curb chain or strap.

The upper branch of the cheek-piece will of itself cause the bit either to stand stiff or fall through, if it exceeds or falls short of

the proper length, as shown in figure 44, where de represents the height of the bars, db an upper branch equal to de , dc one of only half the same length, and da one double the length. When a pull of the rein acts at f on the lower branch, the curb will be drawn closer to the chin, and the mouth-piece back against the bars; and supposing the amount of this closing up in all three instances to be equal, the bit with a long upper branch da , will assume the position $a'df'$. It will be stiff, and the curb acting upwards in the direction ea' , will press on the sensitive part of the jaw.

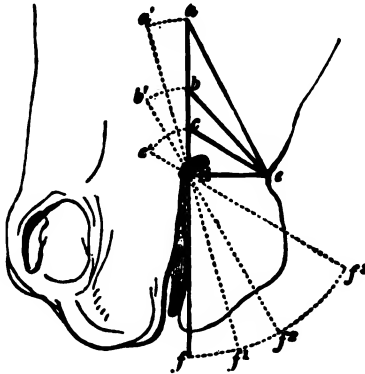


Figure 44. Diagram to show action of curb bit.

On the other hand, the bit with the short upper branch dc , equal half de , will assume the position $c'df'$ —that is, it will fall through. The curb chain or strap will remain in the chin groove, and act forward in the direction ec' , but forming a very acute angle with the branches of the bit itself, will have scarcely any value as a fulcrum.

The intermediate upper branch db , equal de , will assume the position $b'df'$; it will neither be stiff nor fall through; the curb will remain in the chin groove, acting obliquely forward in the line eb' , and will afford a sufficient support; and the lower branch of the lever, fd , being in the proportion of two to one to the upper one, db , there will be sufficient lever action.

In order to prevent a bit with a very short upper branch from falling through, riders often use a very tight curb chain, the result of which is that much of the action is transferred from the interior of the mouth to the chin; also, in order to prevent a bit with a very long upper branch standing stiff, a contrary course is adopted, and by the use of a very loose curb chain the bit is made to fall through.

The curb chain should lie in the chin groove, without any tendency to mount up out of it on to the sharp bones of the lower jaw; otherwise it ceases to be a painless fulcrum, and renders the best constructed bit uncertain in its action.

The only way to attain painlessness of the curb chain, on which so much depends, is by placing the mouth-piece as nearly on that part of the bars opposite to the chin groove as possible. It is only in this position that the right angle triangle is secured, as shown in figure 44. There is also another reason, for that part of the bars which is best suited for the action of the mouth-piece is found here, just above the tusks.

There is considerable irregularity as to the position of the tusks in the mouth, and mares seldom have any at all. For this reason it is difficult to prescribe a uniform position of the bit by any reference to the tusks except that the mouth-piece should be above and not touch them. *For the majority of horses the proper position will be attained by adjusting the cheek straps so that the mouth-piece will be one inch above the tusks of the horse and two inches above the corner incisor teeth of the mare.*

The best fitting bit, even when placed in the right position, will not act properly unless the curb chain be made correctly, and exactly of the right length. A double chain worked flat, without rough or sharp edges, is the best kind for general use, although leather curb straps were used in the American service for many years. Straps are subject to stretching and contraction, and are apt to be stiff and harsh after a few soakings in water, but they possess one great advantage, that of being easily replaced or re-

paired. A properly made chain should last many years without need of repairs.

It is not practicable to prescribe any fixed dimensions for the width of the curb chain. It should be made to lie in the chin groove without altogether filling it up. If very narrow it will cause pain, and if very broad it is liable to mount up and come in contact with the sharp cheek bones at every pull on the reins.

The curb hooks or snaps for use with the chain should be flat, and shaped so as to hold the chain in place securely, and not cut the lips of the horse.

If the mouth-piece is of exactly the same length as the width of the mouth, the curb chain or strap will wrap close around the chin, pressing equally over a large surface. *If the mouth-piece is too long, the chain or strap will bear more or less on a particular spot, and cause a sore in the chin groove.*

The fleshy tongue is much less sensitive to pressure than the bony bars, covered only with a very thin membrane.

The form and volume of the tongue may be varied by its muscular action, which permits of extension, retraction and elevation. It helps to support the bit and receives the first action when power is applied to the reins.

If a perfectly straight bar mouth-piece of moderate thickness is used, this resting almost wholly on the animal's tongue, would be the lightest form of curb bit that could be devised. If by means of a "port," or upward curve in the mouth-piece, pressure is removed entirely from the tongue and transferred to the sensitive bars, with the same amount of lever action as before, the severest form of curb bit results.

Between these two extremes there is a wide range, and the whole art of bit construction consists, so far as the mouth-piece is concerned, in determining how much of the pressure shall fall on the tongue and how much on the bars.

It is necessary that the parts of the mouth-piece to act on the tongue and bars respectively should keep their places. This requires that the mouth-piece fit exactly the width of the mouth,

and the width of the port be not greater than the width of the tongue channel. If a mouth-piece with a port be too long, a slight pull on the rein will suffice to displace it, in which case the corner of the port may, by being pressed into the tongue, cause great pain, and make the action of the bit very irregular and unsatisfactory. If the port is wider than the tongue channel, a similar thing occurs; if the port is narrower it fails to properly admit the tongue.

The height of the port depends on the thickness of the tongue and sensitiveness of the bars, and on the temperament of the animal, as well as the use to which he is to be put. The most severe bit it can ever be necessary to use is one in which the height of the port is about equal to its width. Any higher port would strike the palate, causing more or less pain, and induce the horse to bore with his head away from the rider's hand.

The plane of the port should coincide with the plane of the upper branches of the cheek-pieces.

The United States Cavalry curb bit is made with straight lower branches with lip strap rings set in rear. The lip strap running from the rings on the lower branches up to a small ring at the center of the curb chain serves the double purpose of holding the curb chain in its proper place and preventing the horse from turning the bit around in his mouth by throwing up his head. Each upper branch bends out on a gradual curve from the mouth-piece to the top of the upper ring. The curb bits are of five sizes to provide amply for all horses likely to be found in service. (Figures 45 and 46.)*

* The double reined bridle with bit and bridoon was abandoned in the American Cavalry during the Civil War. Many efforts have been made to reintroduce double reins for use with a curb bit with two rings added at the ends of the mouth-piece. After forty-five years of trial and experimentation of many bits the Cavalry Board has recommended a return to the bit and bridoon and the adoption of new models of both curb and snaffle (Figure 46) which possess so many admirable qualities as to commend themselves to both military and civil riders.

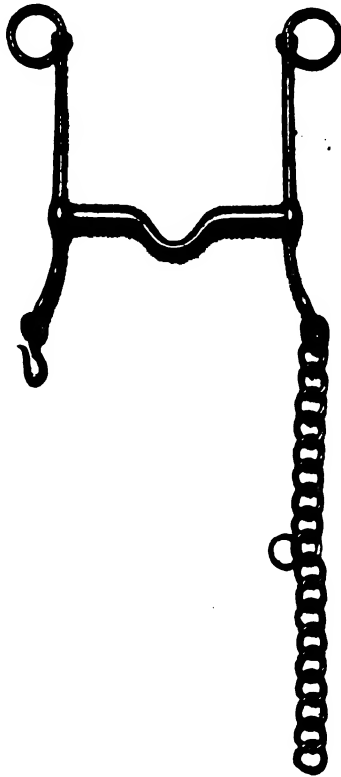


Figure 45. U. S. Cavalry Bits.

The arrangement of the bridoon on a separate head-strap adds to the security and strength of the bridle by avoiding the attach-

Figure 46. U. S. Halter-Bridle, Model 1912.

ment of both bits to one headstall. If by accident the curb headstall breaks the bridoon bit remains in the horse's mouth, and if

the bridoon head-strap breaks the curb bit remains intact. The bridoon mouth-piece, of which there is but one size, is adapted for use with the curb bit, or alone with the watering or exercise

Figure 47. U. S. Bridle, Model 1917.

In some bridles the cheek-pieces of the headstall are sewed directly to the bit, but in military bridles, arranged to fit many different horses, buckles or toggles are used in order to admit of

adjusting the bit, and also to permit of its being removed for cleaning.

The subject of bits has received spasmodic attention in the past, but has been much misunderstood, and as a consequence the government arsenals have been periodically filled with tons of discarded bits, and hundreds of animals have been condemned really because indifferent riders could not handle fresh young horses with the instruments of torture issued as bits.

The bits in use in the American army in past years are shown in figure 48, Nos. 5, 6, 7 and 8, are various sizes and shapes which were used during the Civil War and for some years thereafter. The high port of No. 6 and the ring bit (No. 5) show that the troopers were taught that great severity was necessary to conquer their mounts, whereas the very fact of putting such instruments in the average mouth had the effect of causing the horse to become frenzied under a rough hand.

Nos. 1, 2 and 3 show the "Shoemaker" bit, which was in use for about twenty years, and which was abandoned for the model shown in plate 48 as No. 4. This is a very mild bit, having but one height of port for all. The only variation is in the length of mouth-piece, which for the three sizes is four and one-half, four and three-fourths and five inches.*

It is observed that the bit and bridoon are used generally by European, and also by the British cavalry. The accurate biting and training of their horses is sufficient evidence to establish the great value of the combination for military purposes.

In figure 49 are shown the British bits (No. 1), the German (No. 2), the French (No. 3), the Russian (No. 4), and Austrian curb bit (No. 5).

* The horses of the Fort Leavenworth school squadron, consisting of four troops, were measured in 1895 with a mouth gauge to determine the widths of their mouths. Nearly all measured less than four and one-fourth inches. Only two horses measured as much as five inches.

The British curb bit (No. 1) is quite heavy, and as powerful as the "Shoemaker" bit abandoned by the American service. The curb chain is very large, and the bridoon is much larger than such secondary bits usually are. It does not compare favorably with the other equipment of the British cavalryman, which is second to none in Europe. The weight of the two bits is two and three-fourth pounds.

The German curb bit (No. 2) has a hollow mouth-piece of large dimensions, and is intended to be a very mild bit. The cheek-pieces are straight, except at the bottom there is a slight curve to the rear where the ring is attached. The curb is a double mail chain, neatly and strongly made. The bridoon is the most perfect of any of those shown in the illustration. The quality of material and workmanship is of the highest class. The weight of the two bits is one and three-fourths pounds.

The French curb bit (No. 3) is well made and mild in its action. The curb is a flat steel mail chain, of good quality. The bridoon is a double-jointed snaffle. It is attached to the headstall by toggles. The cheek-pieces of the curb bit are straight, and contain lip-strap rings on the lower branch. The weight of the two bits is two pounds.

The Russian curb bit (No. 4) differs from the others in being hooked to the headstall. The headstall to which the snaffle is attached forms the essential part of the halter. The bridoon, which is a double-jointed snaffle, is attached by toggles. The upper branches of the curb bit are provided with hooks bent outward; these hooks are broad and flat, and are passed through small steel rings in the lower end of the cheek-pieces of the bridle. The rings are shown in the illustration with the bits. The bit is provided with lip-strap holes. This curb bit has the longest lower branches, in proportion to the upper, of any of the other bits. The weight of the two bits is one and three-fourths pounds.

The Austrian curb bit (No. 5) is very heavy, being made of steel, with solid mouth-piece. The flat mail chain curb is the best

of its class, and is not apt to be broken or stretched by ordinary service wear. The bridoon used with this bit is a single-jointed snaffle with rings and half cheek guards. The Austrians make nine different sizes of bits in order to provide amply for accurately fitting all the horses. The weight of the curb bit shown is one and five-eighths pounds

In comparing these bits it is observed that there are no very material differences in those used in Europe. The German is the mildest, but it answers the purpose fully with their carefully trained horses.

Bits should be made of the best materials and as light as possible. It should be remembered, however, that cavalry horses are subject to exciting conditions, and bits of sufficient size and degree of lever power must be retained for the purpose of controlling animals at the charge and in the resulting mêlée.

Reducing the amount carried in the horse's mouth may not seem to be a very important matter at first glance, but when it is considered that a handicapper may, by adding or taking off a pound from the weight carried on an animal's back, entirely upset all calculations as to the result of a race between animals of equal form, it ought to be apparent that a pound more or less, at the end of his neck, makes a great difference to the horse.

CHAPTER V.

BITTING AND TRAINING.

End and Aim of Biting.—The Aids.—Principle Governing Biting.—Effect of Head and Neck.—Uses of Snaffle and Curb Bits.—Dumb Jockey.—Training Halter.—Running Rein.—Establishing Gaits.—Bending Lessons.—Jumping.—Use of Longe.—Selecting and Fitting Curb Bit.—Fitting and Adjusting Bridles.—Desirable Standard of Training.

The end and aim of biting and training should be to bring about such confidential relations between rider and horse as to cause the slightest wish of the former, when indicated through the aids, to be obeyed without constraint, resistance or exhibition of temper.

The aids in riding are the hands, legs and reins, which, assisted in a minor degree by the whip and spurs, serve to indicate the will of the rider and to assist the horse in conforming thereto.

The reins serve to prepare the horse to move, and to guide, support and halt him; their action should be gradual and in harmony with that of the legs. In using the reins, the arms should have free action at the shoulder; when a light pressure is sufficient to govern the horse, the action of the hand should be at the wrist; for greater pressure, the elbow should be carried back without raising the hand.

In riding, the bridle hand should be kept steady; it should oscillate with the motion of the horse's head but at the same time bear lightly, for the bit causes pain if constantly pressed on the bars, gradually destroys their sensibility and leaves the horse with a hard mouth.

The hand is best which, by giving and taking, keeps a constant touch on the bit and controls the horse with the least force. The hand is light when there is an almost imperceptible alternate feeling and easing of the hand in harmony with the motion of the horse, the delicacy of the mouth being preserved.

The reins act to direct the forehand ; the lower legs to incite action and govern the movement of the haunches. The pressure of the legs should be an elastic, muscular action ; a heavy clinging pressure or thumping with the heels will not produce good results.

The legs assist in guiding and controlling the horse. Closing the knees, without pressure by the lower parts of the legs, tends to steady the horse in position. Carrying the lower legs slightly to the rear, closing them equally with slight pressure, prepares the horse to move or if already moving, to keep him up to the bit. When the lower legs are closed with greater pressure they urge the horse forward. Carrying the right leg to the rear and closing it with pressure, causes the horse to move his haunches to the left. Corresponding action with the left leg causes the horse to move his haunches to the right.

Before executing any movement the horse should be gathered by gently drawing in the reins, carrying the lower legs slightly to the rear and closing them equally with but slight pressure.

To move forward : close the legs with pressure, the hand remaining passive.

To decrease the gait or halt : sit well down in the saddle, increase the pull on the reins and the pressure of the knees and thighs and relax the pressure of the lower legs.

To cause the horse to back : increase the pressure of both reins and legs, carrying the lower legs to the rear and, if necessary, leaning back in the saddle.

To change direction : carry the hand towards the side to which the turn is to be made, pressing the opposite rein on the horse's neck ; close the knees gently and apply pressure with the lower leg on the side to which the turn is being made.

To turn on the forehand : draw in the reins, with enough pull on the bit to keep the horse from advancing ; carry the hand gently toward the side to which the head is to move, at the same

time carrying the lower leg on that side to the rear and closing both knees.

To cause the horse to side step or passage: carry the hand toward the side to which the passage is to be executed, maintaining a pressure of the knees and enough pull on the bit to keep the horse from advancing; close the opposite heel and cause the haunches to move with the forehand.

A knowledge of biting is very essential, for it is only by means of it that perfect control of the horse can be obtained without the infliction of unnecessary pain. It is especially important to cavalrymen, for upon its application depends the steadiness of the horse in all maneuvers on the drill ground and the field of battle.

The various purposes to which horses are applied demand of course different details of handling. One principle applies to all, namely: to get the whole lever power of the animal to act in conjunction with its weight in the required direction, and with such

on the bit that all its motions may be con-
ering in too abrupt a manner with its action.
ver by means of which command over the
ze, shape, weight, and the manner in which
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heavy in hand, for more depends upon the
d is set on the neck, and the facility thereby
g a great variety of positions, than on the
head itself.

lever action of the head and neck, it is
that the effect produced depends not only on
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ing the horse's head as a lever which is to
bring it towards the rider's hand, it is evi-
be stretched out in continuation of the lat-

ter, as is done on the track by race-horses, there is no lever action. In the same way if the horse's head is brought in until it touches his neck or chest there will be little if any lever action.

The lever action is greatest when the head is at a right angle to the neck ; the more it departs from this position, in consequence of severe biting or other causes, the less will be the useful lever action. With the great majority of horses the physical conformation of the jaws opposes no obstacle to the head assuming this desirable position.

The bit should be regarded as a means of communication between horse and rider, as well as an instrument which may check and master the animal. The impression it conveys may vary from the slightest sensation to the most intense pain. If the mechanical effect of the bit be in proportion to the sensitiveness of the mouth, it becomes a rational and useful instrument, through which the wish of the rider may be indicated to the animal.

Rational treatment produces better results than harsh means in the training of horses. A little patience and expenditure of time on the primary lessons makes matters easier later on.

There are many books which prescribe in detail all the various steps in the training of horses, but these are seldom carried out in the service for the reason that men are not available for the performance of this important work, which, to be valuable, must be not only progressive but continuous.

The period of training will of course vary with the amount of instruction the horse has received before purchase. Horses frequently arrive at stations in such a forward state of training that all they require is to be familiarized with the sound of firing, trumpets, and other unusual noises and sights. In general, however, the new horses require considerable work before they are fit for the ranks.

Occasionally an animal will be found to resist all training. It is customary in the American service to apply the Rarey system to

such animals until brought under subjection. This system is sometimes applied to all horses in order to finish their education, to make them recognize how completely they are in the power of man, and to give the troopers a knowledge of the means to conquer refractory animals.

It is not enough that the horse may be ridden along with the others, but he should be under such perfect control that he will leave the ranks at any time and under any circumstances, at the will of the rider, without refusing or crowding towards the other horses.

Practice varies slightly in different organizations, but a brief description of what is practicable in the average regiment will be given.

Upon arrival of new horses they should be examined, with a view to determine if they are suffering from any injury or disease. They should be fed but little grain until all signs of the feverish condition incident to change have passed away. Those that are well should then be distributed amongst old and gentle horses at the picket line. While the hoof numbers are perfectly plain, the descriptive lists should be compared, and the horses entered in the troop records, and a name assigned to each.

A horse should be allowed to grow familiar with his surroundings, and made to understand that he is perfectly safe from any injury. When turned loose in corrals or paddocks an attendant should be at hand to prevent the old troop horses from injuring the young remounts. Until the remount is accepted in the herd by the old horses he is not infrequently subjected to much annoyance.

The horse's feet should be handled, and he should be led into the blacksmith shop while other horses are being shod. Horses are often severely injured when frightened at the noises and sights about the forge and anvil. It is not necessary to shoe the

horse unless the ground where he is to be trained is rocky or hard, but his hoofs should be rasped down enough to prevent them from splitting.

Troopers mounted on old horses should lead the new animals about the post during ceremonies and drills, in order that they may not be frightened at the band, movements of troops, fluttering of flags, and many other things not to be seen in the vicinity of farms.

The horse is now ready to begin his training in the riding hall, or where there is none, on a ring prepared on ground selected for the purpose at some place where the attention of the animal will not be distracted from the work in hand. *It should be borne in mind that the average horse, which has not been much handled, will be nervous and apprehensive; that his desire to avoid strange objects and unusual sounds will lead him to resistance; that this resistance must be overcome gently but firmly and the horse be made to understand that obedience is met with kindness and misconduct with punishment.* Punishment must not be administered to animals which are merely nervous, or playful for want of exercise; in the latter case great care is needed for fear that a simple breach of training discipline may end in a runaway or other grave misconduct. It is easier to train a new horse than to remove the faults from a spoiled one.

As all animals are ridden before being accepted, it is usual to put on a snaffle bit at once. This may be attached to the halter, but for training new horses it is much better to use a bridle headstall with the snaffle bit buckled on, so that it can be adjusted properly on the bars.

The snaffle is used to elevate the head and pull it around laterally, while the curb bit is used to depress the head and to restrain the horse. By using the snaffle to elevate the horse's head and the curb bit to draw back his chin, the rider is enabled to bend the horse's neck just back of the poll and place him in balance and under perfect control by reason of the lever action thus obtained.

By the same means the rider is enabled to prevent the average horse from bringing his chin back against his chest—a trick frequently resorted to by confirmed bolters.

If the young horse frets and fails to feel or take the bit properly when mounted, he must be handled very gently, and allowed to follow the lead of an old horse quietly at a walk until he establishes himself in the new conditions of equilibrium sufficiently to move up to the bit without leaning upon it, refusing to feel it, or to allow it to exert pressure on the bars of his mouth.

If the horse continues unable to "take the bit" properly he should be fitted with a "dumb jockey," which is a cross-tree of wood on a padded surcingle. The reins of the snaffle bit are attached to the cross-trees at about the height of the rider's hand, and straps in rear are carried back to a crupper, to prevent the cross-tree from falling forward. The straps should be so adjusted that the animal feels the pressure of the mouth-piece, and this may be gradually increased from day to day until he arches his neck or raises his head enough to lighten his forehead. This will be easily determined by the appearance of his step. The horse rigged in this manner should be turned loose by himself in a small enclosure, so that he may devote his brain to working out a solution of the problem before him. The instruction in this way should not be continued for more than half an hour at a time, for if left until very tired the horse loses his fear and leans so heavily on the bit as to destroy much of the sensitive feeling necessary to a good mouth.*

A useful training halter may be prepared by attaching a strong strap to the lower part of the cheek-pieces of the bridle, to go around the nose above the nostrils, and which can be tightened

* Under the advice of a "practical horseman" of considerable local reputation, the author, some years ago, turned a colt loose for hours at a time with a dumb jockey, well tightened up, to give him a good mouth. The result was to reduce the animal's mouth to so insensitive a condition as to seriously impair his value.

under the chin by means of a buckle on one end of the strap in rear. This adjustable noseband may carry a ring in rear for the snap-hook of the longe, or an iron cavesson with nose-ring may be padded and riveted on in front to the noseband. This latter gives the longe-holder a powerful instrument for controlling the horse, and should be used with great care.

Sometimes the horse will not hold his head in a proper position, and it becomes necessary to apply a running rein, which acts directly on the snaffle bit, independently of the reins. The action of the running rein may be increased or reduced without the necessity for any alteration of buckles or straps.

A running rein consists of a strap about eight or ten feet long, of the size of an ordinary bridle rein, with provision at one end for buckling it to the ring on the near side of the saddle. A chin strap, carrying a ring sewed on in rear, is buckled into the snaffle rings in the same manner as a curb strap. A single martingale, with a ring held at the height of the point of the shoulder by means of a strap around the neck, completes the parts necessary to operate the running rein, which passes from the ring on the left side of the saddle through the martingale ring, thence through the curb strap ring, back through the martingale ring, and then to the right hand of the rider.

A pull on the running rein will act directly on the mouth-piece and draw the mouth backward and downward towards the horse's chest.

The rider should continue the work on the track or in the school day by day, varying the gaits from a walk to a trot, and finally to the gallop. The horse should be taught from the very first to execute the turns by the pressure of the outer rein upon his neck, the mouth-piece being pulled, if necessary, by the inner rein. The rider should avail himself constantly of the use of the aids in turning, increasing or decreasing the gaits and in halting.

Every cavalry post should have a measured track, so that during the period of training, the young horse may be established in

his gaits of walk, trot and gallop at the regulation rate per mile, which is four miles an hour for the walk; eight miles an hour for the maneuvering trot or trot out and canter; twelve miles an hour for the maneuvering gallop and sixteen miles an hour for the full or extended gallop. If the horse, going at any gait, shows signs of breaking into a faster gait, he should be checked at once and given his head only after he has steadied himself in the original gait.

It is most important that a cavalry horse should be a good walker. His steps at that gait should be long and regular, without jogging. To accomplish this he must be given a free rein—to have his head—since he can walk best with his neck extended. If his head is held in by a tight rein, at this or any other gait, it causes him to shorten his steps and to go into the air instead of moving rapidly forward. After a horse has been trained properly to the marching walk, it is an easy matter to bring him to a short parade step by holding him in and closing the legs gently to force him up to the bit without halting or changing his gait. This applies equally to other gaits.

Next in value to the fast walk is the moderate trot. This may be modified by holding the horse in, to a slow trot, or by causing him to trot out by extending his strides. The cavalry horse should be taught to take the trot from a walk by slightly moving or raising the reins and closing the legs until he breaks into the desired gait; if he is moving at a gallop, by closing the legs and reining in until he slackens his pace enough to make the change to a trot, when he should be quickly established at the rate of speed desired and then given a light rein. Men in ranks are very apt to ride at a trot with too much pull on the reins, particularly after coming down from a gallop.

Closing the legs whenever an increase of gait is undertaken will accomplish better results than thumping with the heels, for the latter is apt to cause the horse to jump forward and disorganize his movements for some time.

The gallop used in ranks is generally the canter or school gallop. It requires much patience and skill to secure uniformity of pace in a squadron at the gallop. Some horses will plunge nervously to get in advance, while others may require some effort to keep them up to the line. This is where the extent and value of the preliminary training is shown, particularly as to the positions of the horses in ranks. If each horse could be made to lead off with the same foot, any inclination of the horses' bodies from the direction in which moving would be the same throughout. If one leads with the right and another with the left foot, and they are not held straight in ranks, it is evident that a boot to boot touch soon becomes impracticable and the troop spreads out. Every organization, sooner or later, finds itself with horses which gallop with their croups well over to the side with which they are leading. Being nervous and easily interfered with, they constantly change their leads during drills and move their croups over each time, one horse thereby occupying about as much space in ranks as should be required by two. The only way to avoid this is through constant hard work and training of both men and horses, to the end that each horse shall gallop practically straight to the front no matter with which foot he may be leading.

When a horse on a straight course is leading with his off (right) fore foot the right shoulder will be slightly in advance and the tendency of the horse is to carry his croup over to the right. The reverse is the case when he leads with the near (left) fore foot. Some horses alternate the leads with frequency while other horses will invariably lead with the same foot and appear disconcerted if made to change. In high school training horses are taught to change the lead at the will of the rider even to the extent of changing at every stride. This is not at all necessary for cavalry purposes, but on the other hand if a horse is allowed to lead habitually with the same fore foot, the corresponding hind leg will have more than its proper share of work and be likely

eventually to suffer in consequence, if much of a load is carried on his back.

To cause a horse to lead with his off (right) fore foot he should be collected by the rider gathering the reins, closing his legs, increasing the pressure of his left heel; a slight play of the reins, more pronounced with the right, together with the left heel pressure, will induce the horse to make proper disposition of his hind legs and lead off in the gallop right. A contrary course will induce the horse to gallop left, taking the precaution if he be at a gallop to bring him down to a trot before making the change. In the riding hall or on a curved track, the horse galloping true leads with the fore foot which is nearest the center, and the change of lead is naturally effected by turning about and moving around the track in the opposite direction.

The horse's balance and his lightness in hand depend on the proper carriage of the head and neck. The bending lessons serve to render the head and neck supple and to make the horse conform to the movements of the reins and yield to the pressure of the bit; the snaffle bit is used for this instruction.

To bend to the right. The trooper being on foot: Take a position on the near (left) side of the horse, in front of his shoulder, and facing towards his neck; take hold of the off (right) rein with the right hand, close to the bit and take the near (left) rein in the same way with the left hand, the thumbs toward each other, backs of the hands up; bring the right hand toward the body and at the same time extend the left arm so as to turn the horse's head to the right. The force employed must be gradual and proportioned to the resistance met with. Care should be taken not to bring the horse's nose too close to the front of his chest. If the horse moves backward, continue the pressure until he stands still and yields to it with his neck. When a horse yields after resistance he generally champs the bit; he should then be patted and encouraged, and allowed to resume his

natural position by degrees. The bend to the left is executed in a similar manner, the trooper taking his position on the off (right) side of and facing the neck of the horse.

To cause the horse to arch his neck. Take position on the near (left) side of the horse; cross the reins behind the horse's jaw; taking the near (left) rein in the right hand and the off (right) rein in the left hand at about six inches from the bit rings; cross the reins and apply pressure until the horse gives way and brings his nose in. Prevent the horse from raising his head by lowering the hands.

To cause the horse to lower his head. The trooper being mounted: Take the right rein in the right hand and the left rein in the left hand; feel lightly the pressure of the bit on the bars of the horse's mouth; then, holding the hands low, play with the bit gently drawing in the reins as the horse lowers his nose. When the horse yields, and brings in his head so that the face is about vertical, release the tension of the reins.

To cause the horse to elevate his head. The trooper being mounted: Hold the reins separately as prescribed for the preceding exercise; extend the arms forward and make light pulls upward upon the reins; when the horse has brought his head to the desired position lower the hands slowly so that the horse can lower his muzzle and then gently pull in the reins until the face of the animal occupies a vertical position.

To cause the horse to carry his head to the right. The trooper being mounted: Hold the reins separately as prescribed for the preceding exercise; draw in the right rein, carry the head of the horse a little to the right, using the left hand to measure the effect of the right and keep the face of the animal vertical. In time the head should be brought around so that the front, still vertical, shall face to the rear. After the head has been carried to the right, it is returned to the front position by the left rein supported by the right, the vertical position of the head being maintained by a play of both reins. In a similar manner, the head

may be carried to the left. In all these movements the rider should be patient and satisfied with slow progress.

It is presumed that good results have followed the lessons which have occupied such time as the intelligence and progress of the animal demanded. The animal should now be taught to leap the ditch and hurdle. For this purpose he is taken out with a good safe jumper, and led quietly across ditches and over such obstacles as present themselves, logs, rails, piles of earth, brush, etc. He is made to leap them at a slow gallop, care being taken to vary the course as much as possible. When the animal ceases to have any fear, or to make any resistance in the fields and pastures, he should be taught to jump the bar and hurdle in the riding-school or on an enclosed track.

In order that he may not expect to be led over all the time, he should now be equipped with a longe, or rope lariat; he should be taken up to the obstacle by a dismounted man, giving him but little rope at first, and he should then be made to jump. If necessary, another man may go in rear of the horse with a whip, to touch him if he tries to come back. If he jumps without fear, no snapping of the whip or shouting should be allowed, else he will connect these in his mind with jumping. The longe should be ordinarily attached to the halter ring, but few horses requiring the use of the cavesson ring.

The training should be continued until the animal performs everything required of him in an intelligent manner in the school and outside. During this period he should be accustomed to the saber and to firearms until, without fear or exhibition of nervousness, he permits both to be used by the mounted trooper. He should be ridden near the pistol targets until he goes equally well to the right and left and between the targets without fear.

The horse is now ready for the curb bit, which should be carefully fitted to him under the supervision of an officer. It is a common thing for a trooper to exchange horses and he usually takes his bits as part of his own equipment. This should never

be allowed, for the horse once properly fitted with a curb bit should be ridden with that bit, or one of the same size, as long as he remains in service.

The integrity or entireness of the tongue should receive careful attention in connection with biting. It is no uncommon thing to find a troop horse with his tongue cut a quarter or half way across. A proper bit will not do this if used in a legitimate way, but almost any curb bit will do so if the reins be used for hitching a nervous horse.

A bit should be selected and placed in the horse's mouth over the tongue. By pressing it lightly against one side it will be seen if it has the right length of mouth-piece. If it is too narrow it will pinch the lips, and another must be tried. If too wide, a measure of the amount which projects over must be taken, and a mouth-piece that much shorter be selected.

The selection of a bit of proper width may be facilitated by slipping a smooth stick into the horse's mouth, placing it opposite the chin groove, and then bringing the thumbs lightly against the horse's lips. Hold the hands firmly in place on the stick while removing it from the horse's mouth, and have an assistant cut notches opposite the ends of the thumbs. This will give the length of the mouth-piece between the cheek-pieces.

Care should be taken in the fitting and adjustment of the bridle as well as the bit or bits. A headstall should be selected in accordance with the size of the head of the horse. The throat latch should not be buckled tight, but loose enough to admit four fingers between it and the throat so as to avoid pressure on the wind-pipe and the large blood vessels. If a single reined bridle is used the cheek-pieces should be of such lengths that but little adjustment of the buckles is required to cause the mouth-piece of the snaffle or curb bit to occupy its proper place on the bars, which is about one inch above the tusks of a horse and two inches above the corner teeth of a mare. This will place the mouth-piece about opposite the chin groove. The curb chain or

strap should wrap smoothly around the chin groove, and be loose enough to admit one or two fingers underneath, when the upper branches of the bit are in line with the cheek-pieces of the headstall.

When the double reined bridle is used the curb bit, *buckled to the front cheek pieces*, should occupy the position already described and the bridoon should be attached to the rear cheek-pieces, shortened up enough to let the mouth-piece of the bridoon rest against the corners of the mouth without wrinkling the lips. If the bridoon is attached to the front cheek-pieces it will work against the curb bit instead of the bars.

After having secured a bit of satisfactory dimensions, the curb chain should be carefully adjusted. In adjusting the curb chain, hook it on the off (right) side; then twist the chain from the loose end until all the links lie smooth and flat and insert one of the end links on the near (left) side hook. That link should be selected which allows the cheek pieces of the bit to move through an arc of about forty-five degrees when pressure is applied. If one link confines the movement to less and the next link allows a movement of more than forty-five degrees the temperament of the mouth or manner in which the horse carries his head should determine which of the links should go on the hook. If the horse has a naturally high carriage of the head he may be allowed the extra link, or loose chain.

Horses once well trained seem able to adapt themselves to many forms of mouth-pieces, but it is well to remember that good biting is characterized by a total absence of stiffness or painful action, and if this be attained, ready obedience to the rider's hands and legs will follow.

If a trained horse opens his mouth, acts as if he was gagged, twists his head sideways, endeavors to force the hand by carrying his head low, or sticks his nose high in the air to remove the pressure from the bars, or moves backward to avoid the bit, he gives full evidence that the bit either does not fit or is not adapted

to the temperament of his particular mouth. Corrections in the character and adjustment of the bit should be immediately made or a spoiled horse may be the penalty of neglect.

The dimensions and proportions prescribed for bits should be productive of satisfactory results in most cases. Some horses will of course be found which will appear to defy all rules. Some may need greater severity than is produced by the bit used for average horses. If the lower branch be lengthened it will of course give greater power, but cruel contrivances will never stop a confirmed bolter and sometimes a mild bit will accomplish completely what severity has failed even to modify.

It should be borne in mind that the two common and grave defects of bits are "falling through" and "standing stiff" and that good biting lies between these two extremes; that nothing is more certain than that any horse will go much better with a well-fitting bit, properly placed, than with one not suited to his particular mouth, and that many otherwise fretful and dangerous horses become perfectly tractable if properly bitted.

Many young horses of fair promise are ruined by nervous and impatient troopers who expect the trained manners of the high school before the animal has progressed beyond the awkward action of a kind-natured but ignorant colt. Rough treatment at this stage is apt to make the animal either timid or vicious.

It may be well to explain here why the fresh and sensitive mouth of the young horse conveys the sensation of hardness to the hand of the rider, and why the same mouth, after it has really been rendered more or less callous by the application of the mouth-piece to its delicate organization, comes to be called tender.

When a young horse is mounted for the first time the equilibrium of the animal is disturbed, and he bores on his bit, trying to acquire a new point to lean on—a fifth leg, as it were; he is hard-mouthed. When the animal has learned to carry the rider, and acquired an artificial equilibrium suited to the altered circum-

stances, he no longer seeks this support, and the mouth is called tender.

If a horse be first ridden without a bit until brought into equilibrium with his rider, and a light snaffle bit be then put on, his mouth will be found very sensitive, and it will be several days before he will take the bit.

From what has just been stated, it will be easy to understand how the seat of the rider comes to exercise so great an influence on the horse's mouth, that the same horse will go light with one and heavy with another rider. It is a question of equilibrium. *Lightness or heaviness of the rider's hand depends mainly upon the stability of his seat.* One rider assumes a seat that favors; another, one that more or less impedes the efforts of the horse to get into balance. Supposing the seat, so far as the distribution of weight is concerned, to be identical, the unsteady rider will seek a support in the reins, and the horse immediately bores on the bit; the rider with a steady seat has a light hand, and the horse is therefore tender-mouthed.

All horses should be trained first with the snaffle bit until they understand thoroughly the use of the bit and reins. A horse that cannot bear the pressure of the bit in moderation is of no value for saddle purposes. If he cannot perform satisfactorily with a snaffle bit, a curb bit will produce that fidgety uneasy action called "jibbing."

The conditions surrounding the cavalryman demand that he shall be provided with a bit or bits, which, while allowing him to guide his horse in the lightest possible manner, will yet provide him with ample power to bring the animal to a halt from the charge in the shortest practicable time. A double reined bridle, with bit and bridoon, is the most rational, humane and serviceable arrangement for accomplishing this as well as for all classes of riding which involve cross-country work.

A trooper must ride with one hand, and have the other free to use his arms; therefore the horse must be trained to obey the

pressure of the reins upon his neck, and the legs upon his flanks. This is the most essential part of training. The bit should be mainly used to moderate the gait, to halt and to prevent the horse from forging ahead of the line or bolting. All changes of direction should be accomplished mainly by pressure of the outer rein upon the horse's neck. In this way the horse can be moved on the circumference of a large circle, or he may be turned to the right or left about without gaining ground. Even with rational bits good results can only be obtained through the constant exercise of judgment, patience and painstaking care.

When a horse has been suppled and trained until the rider is enabled to devote his own attention to the performance of his duties without constantly thinking of what the animal may do; when the trooper feels entire confidence that at the proper indication from him the horse will move out and promptly take any gait desired; that he will proceed in any direction without resistance; that the breaking of a strap, firing of a gun or any unforeseen occurrence, or accident will not disconcert the animal, and finally, if the trooper may dismount in some concealed spot and leave the horse, without tying, while the surrounding country is carefully reconnoitered on foot, then both man and horse have acquired a degree of efficiency which should increase the chances of success in campaign of the organization to which they belong.

During more than a half century of riding and training, the author does not recall two horses that seemed to possess the same temperament as regards mouth and obedience to the aids. Of course there may be found, in every regiment, numbers of old troop horses whose mouths have long since succumbed to rough hands and which may appear alike to inexperienced riders. It is certain that every young horse of spirit has his own personal equation and if one would train him properly his peculiar temperament must first be solved and his biting and training proceed in accordance with the requirements of his particular case.

CHAPTER VI.

SADDLES.

Construction and Adjustment.—Materials of which Constructed.—Under Surface: Shape; Size Proportioned to Weight Carried.—Upper Surface: Size Proportioned to Bulk Carried.—Position of Saddle on the Horse.—Side Bars: Length; Shape; Adjustable.—Padding: Pads; Blankets.—Cruppers.—Breast Straps.—Rules for Selection and Arrangement of Saddle and Pack.

Saddles are made in a great variety of shapes depending somewhat upon national habit as well as upon the use to which each particular saddle is to be put. The jockey's saddle may be reduced to a mere contrivance upon which to hang a pair of stirrups. The average individual requires something with more substance and the cavalryman requires a saddle very much heavier than does the casual horseback rider.

Cavalry saddles are all designed with reference to carrying heavy weights, for no nation has as yet discovered any method of placing cavalry in the field for extended operations without requiring individual troopers to pack a large amount of necessary equipment and personal kit.

The serious disadvantages of heavy and cumbersome packs are fully recognized in every army, but efforts to reduce them have not always resulted favorably to efficiency. There are certain things necessary to enable the trooper to keep himself and his horse in serviceable condition, and the only practicable method of reduction in some of these is by substitution of lighter material or by furnishing transportation of sufficient mobility to carry light baggage without delaying the column.

In general terms the nomenclature of the saddle (figure 50) comprises:

The pommel or front part above the bars;

The cantle or back part above the bars;

The side bars; the parts running along the sides, which rest on the horse's back and to which are attached the pommel, cantle, seat cover, stirrups and cincha attachments;

The seat ; the part embraced between the pommel and cantle.

The materials of which saddles are made should combine great strength and moderate elasticity, with the least possible weight. Wood, iron or steel plates, and leather, constitute the principal materials of which saddles are constructed.

Military saddles are best made of wood, with only such simple plates of metal added as are necessary to secure wooden parts in place. The weight to be carried renders it imperative to economize every ounce that is possible. The necessity of attaching a pack makes the question of neat appearance altogether secondary.

There is much variation in military saddles, both as to shape and capacity for carrying packs. They are nearly all provided with large side bars, some of which are much longer than others. Nearly all are made with pommel and cantle arches sufficiently high to clear the horse's withers and back.

The long side bars enable the pack to be attached so that it will not rest on the back, but they are a disadvantage when made so long that they receive any of the muscular action of the fore and hind quarters. The short and broad side bars answer the purpose when the pack is secured, as on American saddles.

The shape of the side bars is a most important item, and the angle which they make with each other must be fixed to suit the average horse of the class purchased for cavalry service.

Saddles with adjustable side bars have been tried with some success, but are not likely to come into general use. The advantage claimed for saddles constructed on this principle is, that in campaigns where hard marching and scanty forage prevail, the horses fall away rapidly, and the loss of flesh under the saddle is not always uniform ; the ordinary saddle then ceases to fit and the horse's back becomes sore, whereas the saddle with adjustable side bars may be altered to suit the varying condition of the horse.

The mechanical arrangement of the saddle, and the manner in which it is adjusted to the horse's back are of the greatest im-

BRIDGE

CANTLE

Figure 50. American Cavalry Saddle. (McClellan.)

portance ; in war defective saddles, or ignorance as to their proper adjustment on service, are as much to be feared as an enterprising enemy.

In examining the saddle, beginning with the under surface or portion coming in contact with the horse's back, two principal points present themselves for consideration : its size and shape.

The under surface of the saddle should bear as nearly as possible the same relation to that part of the horse's back it is intended to occupy, as a mould does to the cast that is taken from it, excepting that the strip lying over the horse's backbone should remain altogether out of contact with the saddle.

As regards size or extent of the under surface, the greater this is with a given weight, the less will be the pressure on any given point, provided always that the pressure be equally distributed over the whole surface. No part should come into closer contact than another, for the result of concentrating pressure on one point or line is very apt to be a sore back.

The upper surface or seat of the saddle should be proportional to the bulk of the rider, and the under surface should be proportional to the weight to be carried. The under frame of the saddle should not extend beyond the surfaces where it has to support pressure, which is exercised chiefly in a perpendicular direction. The absolute weight of the saddle itself must also be considered in fixing a limit of size.

The form or shape of the seat is of the greatest importance. If the ridge of the saddle be horizontal, imperfect contact of the rider results ; it is therefore necessary to dip this ridge and spread it into a more or less concave surface where the weight of the rider is applied. The lowest part of the seat should be slightly in rear of its center to permit the thighs to occupy their proper position ; then the rider can bring the greatest amount of surface possible of himself and saddle into permanent contact without undue constraint on his part.

The saddle may fit the horse perfectly, yet, through an improper arrangement of the upper surface, or of the stirrups, may be decidedly unpleasant for the rider.

The rider's center of gravity should be over the center of the bearing surface of the saddle, in order to transmit the pressure equally to the rest of the surface.

The saddle is calculated to fit approximately in one particular location. It should be so placed as to interfere the least with the action of the muscles of the horse, and this condition will be best met when the saddle is located on the broad flat tendon covering the center of the horse's back. This will also locate the weight near the perpendiculars passing through the centers of motion and gravity, and therefore cause an equable distribution of the weight of both horse and rider on all four legs, both in a state of rest and motion and there will be the least tendency to disturbance of the saddle or the seat of the rider when the horse is in motion.

The point where the center of the saddle should rest may be found practically by locating the fourth and fifth short ribs from the rear, and following up the space between them to the back. This will be the point on the spine near the center of motion, but the shape of the horse will have much to do with the saddle remaining in this position.

If the saddle be properly shaped and fits the back of the horse it will have less tendency to move from this position than if placed elsewhere. Great care should be exercised, however, not to unduly tighten the cincha and surcingle with a view to holding the saddle exactly in position. When the cincha is first tightened it should be loose enough to admit a finger between it and the belly. The cincha has a tendency to work loose and may be tightened after the horse has been exercised for a time. The surcingle should always be a little looser than the cincha.

With the rider's center of gravity over the center of the bearing surface of the saddle before any dead load is put on, conditions

are changed instantly when a pack is added at either pommel or cantle. It is here that experience and judgment are required to so adjust the various portions of the pack as to least disturb the equable pressure of the whole under surface of the saddle and prevent sore backs.

Aide from equalizing the weight at the two ends of the saddle, the question of distribution of pack presents itself in another way.

The heaviest part of the rider is above the horse's back. When the pack is added, if piled high, as is the custom in some armies, it will make the horse with his load top-heavy.

As the center of gravity lies below the middle of the horse, the adjustment of the pack should be such as to prevent elevating this center any more than is absolutely necessary. For this reason the saddle-bags, lariat, canteen, rifle and saber should be hung well down on the two sides of the horse, and the pommel and cantle packs strapped down near the ends to keep them close to the saddle. The inability of an animal to recover its balance with a top-heavy pack has been frequently demonstrated in service.

It is necessary to place a yielding substance between the horse's back and the saddle bars. This may be done by padding the under surface of the bars, or by the use of a detachable pad or a blanket. Padding is usually confined to civilian saddles, but there are several nations which still use it on military saddles. The objection to the use of padding in saddles designed to carry heavy loads is that it dries in lumps, draws out of shape, and it is a matter of much difficulty, usually requiring an expert saddler, to rearrange the stuffing to meet the varying conditions of the horse's back on service. Upon arriving in camp at night accumulations of dust and sweat are apt to be neglected, resulting the following day in abrasions of the skin.

Saddle pads made of hair, felt and wool have all been tried very thoroughly. There can be no variation from day to day in the position of the pad on the back, and in case of a bruise or

sore, it is frequently necessary to cut a hole in the pad. None of the pads are of use to cover the animal. The hair pad is the most expensive when properly made, and is probably the best. The felt pad while useful for pleasure riding is not adapted to military service. It works up into the opening between the bars, producing much discomfort to the rider. It also wears out rapidly in particular spots where pressure is permanent.

The saddle blanket was adopted for American cavalry because it has stood the severe trials of service better than any proposed substitute. It can be used to cover the horse in bad weather, and when not needed by the animal is used by the trooper to make his bed on the earth a trifle less hard. The blanket does not change position with every movement of the saddle, and therefore does not wear off the hair of the horse's back. The blanket can be shaken out and refolded, so as to present a fresh, dry and soft surface, which is much appreciated by the horse, for he is made more comfortable, just as the trooper is by shaking out and rearranging his bed blankets in a permanent camp.

The only disadvantage possessed by the blanket is its tendency to work out from under the saddle, behind, caused by the hair of the horse pointing to the rear, opposed to the smooth under surface of the saddle. This may be corrected by putting an under surface of sheep skin, felt or hair on the saddle.

A properly folded wool blanket will seldom cause any trouble in winter. Sore backs are then very rare, and when they do occur may nearly always be traced to some minor injury received in rolling, or from being bitten by another horse, and which subsequently becomes aggravated by the saddle.

In summer, however, the heat arising from the use of heavy wool blankets is a prolific source of puffed backs, which, if not properly and promptly attended to, soon result seriously. In warm weather troopers are much more apt to lounge in their saddles, particularly during night marches, when overcome by fatigue.

Figure 51. McClellan Saddle, Model 1904 ; adjustable quarter straps ; bars covered with sheep skin.

Expert packers recognize this, and as the large leather bags called aparejos, are used with both blankets and corona of wool, they avoid some of the danger from heating by using a piece of cotton canvas, which is placed directly on the back, and upon which the blanket and corona are then laid. They take the additional precaution to leave the blanket and aparejo or pack saddle on the animal for some time after the load has been removed, to enable the back to cool gradually.

Cruppers no longer form a part of the saddle equipment for general use, but are issued in isolated cases where the shape of the horse causes the saddle to have a tendency to slip forward and bruise the withers. Their use for military saddles is to be avoided when possible, as the great weight of the rider and packed saddle is apt to cause the crupper to lacerate the tail.

Breast straps are used only upon a few ill-shaped horses saved from condemnation by the possession of some good qualities, counterbalancing their defective conformation.

The following rules should guide in the selection and arrangement of saddles:

First. Each horse should have a saddle fitted to his back when in medium condition, the upper surface being of a size to accommodate the rider.

Second. The girth or cincha should be attached opposite the center of the bearing surface of the saddle.

Third. The stirrups should be attached slightly in front of the center, so as to be under the seat of the rider, and enable him to maintain such equilibrium as will prevent one part of the saddle pressing more than another on the horse's back.

Fourth. The pack should be reduced to the lowest limit consistent with efficient service, and be so adjusted as to preserve as far as possible the equilibrium of horse and rider, and to prevent one part of the back from being saved up at the expense of other parts.

Fifth. The center of the saddle should be placed on the back over the center of motion of the horse.

CHAPTER VII.

SEATS.

Variety of Seats.—Manner of Holding the Reins.—Value of a Well Balanced Seat.—Safest and Best Seat.—Balance, Friction and Stirrups.—Seat Depends upon Purpose in Riding.—Long Seat; Fork Seat; Military Seat.

In observing riders from day to day it is surprising to note what a variety of attitudes are assumed by them in the saddle. The conformation of the rider of course has some influence, for a short, heavy-built man should not be expected to present the same appearance as a man with very long legs projecting down below the body of the horse.

Those who have acquired a practical knowledge of riding early in life constitute a class almost distinct and apart from those who have deferred mounting horses until full-grown men, although many of the latter become accomplished horsemen. Boys who learn to ride, and have no fear of horses, almost invariably sit well down in their saddles ever afterwards, whereas a large proportion of those who have never mounted a horse until their muscles and bones are "set," are, unless particularly cautioned, very apt to lean forward and fail to maintain close contact with the saddle.

This latter style of riding is nearly always accompanied by a heavy hand on the bit, instead of that easy "give and take" feeling on the horse's mouth, which is so necessary in order to derive any pleasure or comfort in the saddle. This light and changeable feeling of the horse's mouth is incompatible with any but a secure and well-balanced seat.

The necessity for relaxing the pressure of the mouth-piece on the bars, except when it is desired to gather the horse in hand,

ought to be apparent to any thoughtful person, yet more horses are ruined for saddle purposes by a neglect of this than from any other cause. A rider with little confidence in his seat is almost certain to depend upon a good steady pull on the reins for assistance. Hence it arises that when such a person mounts a well-trained saddle horse with a delicate mouth, accustomed to regard the lightest pressure of the reins as an indication or signal from the rider, he at once confuses the animal, which being unable to understand what the pulling means begins to fret and prance, thus making the already insecure seat more so.

Several methods of holding the reins are used by acknowledged masters of the horse. The trooper in mounted combat needs the right hand to use his sword or pistol. The reins must, therefore, be held in the left hand.

The normal method of holding the reins for military riders is to take both reins in the left hand. The bit reins are separated by the third (ring) finger, the right snaffle rein between the first and second fingers, the left snaffle rein under the little finger, all of the reins passing out of the hand over the second joint of the first finger, upon which the thumb presses them with sufficient force to hold them in place; the bight falls to the right of the horse's neck. The elbow falls naturally, the wrist and hand in line with the forearm, the finger nails toward the body (figure 59).

The normal method used at drill and on the march, at rest and in jumping is to ride with both reins, supporting the horse with both the snaffle and curb bit. The normal method used in combat is to relax the reins of the snaffle and ride the horse on the bit. Should the rider wish to employ both hands he should take both right reins in the right hand, the reins separated by the little finger, the snaffle rein underneath (figure 56). When it is desired to hold all the reins in the right hand the method for holding them is similar to that employed when the reins are held in the left hand.

To adjust the reins seize them with the thumb and first finger of the right hand above the left thumb; slightly open the fingers of the left hand, raise the right hand, feel lightly and evenly the horse's mouth with both reins, and close the fingers of the left hand on the reins (figure 53).

To shorten the reins seize the rein or reins to be shortened between the thumb and first finger of the right hand above the left thumb (figures 54 and 55). To lengthen the reins seize the rein or reins to be lengthened between the thumb and forefinger of the right hand below the left hand.

In executing these movements the hands should be displaced as little as possible.

It has already been stated that lightness or heaviness of the rider's hand depends mainly upon the stability of his seat, and this cannot be too often impressed upon the minds of those learning to ride. The training of cavalymen should be proceeded with on the theory that recruits must first acquire a confident seat before they can be expected to comprehend the value of a light hand.

Aside from the great value to the rider himself of a well-balanced seat, the stability of the saddle and the safety of the horse's back are also involved. It is treading on dangerous ground to prescribe one seat as applicable to and the only correct seat for all riding. So long as whole nations ride certain seats entirely different from those used by other nations, it will be seen that habit has much to do with riding. By early training and long practice one may be able to accomplish the end for which he mounts a horse while riding a seat apparently at variance with all orthodox ideas upon the subject.

The safest and best seat is that which permits a proper use of the stirrups in combination with balance and friction. If proof of this were required, it would only be necessary to point out the fact that Indians and other uncivilized nations accustomed to bare-back riding, which is the perfection of balance and friction riding,

uniformly adopt saddles and stirrups as soon as contact with other riders teaches them the value of these articles.

The varieties of seats all depend primarily upon balance, friction, and the aid of stirrups. Of these balance is by far the most important, otherwise a broken stirrup strap or loose girth or cin-

Figure 52. Shows the reins being taken up, sorted and evened. The two outside reins are the snaffle reins; the two reins in the middle are the curb reins.

cha might produce a fall from the horse. The combination of all three, without exclusive dependence upon any one, will give the most satisfactory results.

The purpose for which the rider mounts his horse determines to a great extent the kind of seat he will ride. The jockey, in the



Figure 53. Shows the reins grasped by the right hand for the purpose of lengthening or shortening all four reins.

Figure 54. Shows the curb reins grasped by the right hand to increase curb action.

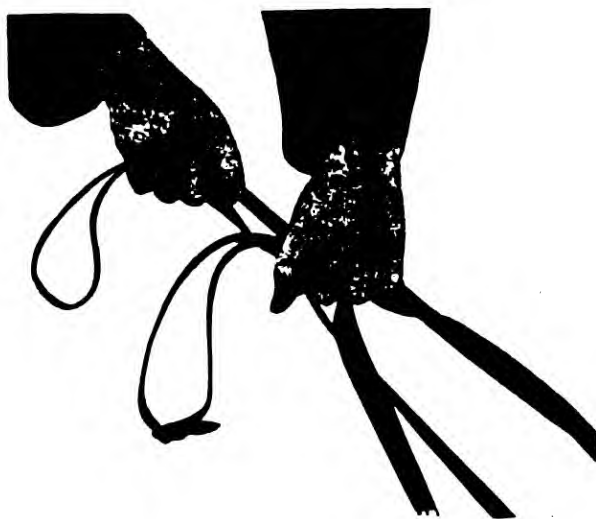


Figure 55. Shows the snaffle reins grasped by the right hand to increase the snaffle action and lessen that of the curb bit.

Figure 56. Shows the four reins used in two hands, the snaffle below little finger and the curb above, or the snaffle reins can be used in one hand and the curb reins in the other hand, as desired.

merest apology for a saddle, with his knees gripping the horse's withers and his feet shoved home in light steel stirrups, and whose sole duty is to ride to orders and land his mount first under the wire, presents few points of resemblance to the cow-boy, who, in a fifty-pound saddle, and riding a fork seat, fearlessly ropes half-wild cattle, or confidently mounts a "bucking" horse.

Military riding cannot be properly classed with any other kind of riding, because its object is entirely different. Park and road riding present no resemblance to it, because in these the individual taste of the rider dictates all his appointments and the gaits of his horse. It is here that the trained and many-gaited saddle horse finds his proper field of action. A light leather saddle is all that is required, whereas in military riding a heavy wooden frame, capable of having a hundred-pound weight of pack attached, is an absolute necessity. A military saddle also has a high pommel and cantle, which detract much from its appearance, but are indispensable because of the pack.

Hunting involves rough riding across country, but the seat is not limited by any such necessities as apply in the case of military riding. In following the hounds the rider has usually a trained jumper, and his riding is practically over a straight-away course involving no sudden turns or halts except in event of accident. Even though the huntsman keeps well up with the hounds, and may at times find himself bunched with many others, it is vastly different from the rushing, thundering noise of a boot-to-boot charge over unknown ground, perhaps in a cloud of dust or smoke, where a secure seat, entirely independent of the reins, is an absolute necessity.

In any particular form of seat all men do not appear exactly the same. Aside from lack of uniformity in instruction there must be some reason for minor variations of seat, and the most probable one is that certain forms of legs are adapted to grasping the horse correctly without undue constraint, whereas it is quite impossible for men with legs of other shapes to sustain the proper grip for prolonged periods.

There are several well-recognized varieties of seats besides the military seat, which, however, contains the essential elements of all good seats.* The long seat, in which the rider raises his thighs almost to a horizontal position, and the fork seat, in which the legs are held straight down beside the horse, perpendicularly to the ground are the most commonly used. The modern American jockey seat, with the knees grasping the horse's withers, is an exaggeration of the long seat.

The long seat is not adapted to military saddles, particularly the American McClellan, but is used very generally for hunting and cross-country riding, where difficult jumps may be expected. It is claimed, and generally conceded, that the horse held between the legs from the calf up, with the knees forward, gives great security when landing after a big jump. In jumping, the difficulty of remaining in the saddle increases rapidly as the obstacle is

* The following excerpt is from a letter to the author from Mr. Edward L. Anderson, probably the most favorably known American writer of the present day, on the subject of equitation.

* * * * *

MY DEAR GENERAL:

I have been re-reading your excellent work, and I find that your training and experience have induced you to adopt as the "military seat" the *only seat*. It is that of Baucher, it is that I have always advocated, it is the seat of every cavalry officer in Europe. The difference in the forms of saddles may give the effect of slight divergences, but the principles are the same, and in the English saddle so generally affected by European officers there is absolutely no change. The illustration (figure 58) is absolutely perfect *for all purposes*. If a slightly shorter stirrup is used in cross country riding which carries back the lower parts of the legs *the seat itself* is not affected, and the shortening of the stirrup, only used with open irons, is that the cross country rider or the soldier may push his feet home when the movements of his horse demand that they should take extra precautions in keeping their feet in the irons.

* * * * *

higher. For this reason hunting saddles are quite often provided with rolls against which to brace the legs.

Figure 57. The fork seat.

In the fork seat (figure 57) the legs are carried down perpendicularly to the ground, and the rider does not remain seated

on his buttocks, but rests on his crotch and the inside of his thighs. The fork seat is a very common one in various parts of America, as well as other parts of the world. While by no means the seat for all-around purposes, it is ridden exclusively by whole tribes and nations of riders, some with the stirrup short enough to hold the sole of the foot parallel to the ground, while with others the stirrup is so long that the toe is bent down to gain contact with the tread. It is condemned for military purposes as unsuited to long marches at a trot, although it is frequently used for long-distance rides on horses, whose habitual gait is an easy canter. It is very commonly assumed during the excitement of the charge by troopers, who, in order to use the saber effectively, stand in their stirrups. The mechanical disadvantage of this seat arises from the fact that when the leg is straight the thigh is round instead of flat as required for gripping the horse.

In the military seat (figures 58 and 59) the rider should sit in the middle of the saddle, taking his weight upon his buttocks equally; the inner surface of the thighs in close contact with the horse and saddle from the knees to the buttocks, the direction of the thighs being about parallel to the horse's shoulders; the lower part of the legs, from the knees down, should fall naturally, the calves in contact with the horse, without pressure, and be completely under the control of the rider for use as aids in directing the horse; the body and head erect and to the front, with shoulders well back; the upper part of the body without constraint; the forearm of the bridle hand horizontal, and the elbow close to the body without pressing against it; the right arm hanging naturally.

The stirrups should be adapted to the seat, and the stirrup leathers should be of such length that when the ball of the foot rests on the tread of the stirrup the heel will be slightly lower than the toes, and both leathers of exactly the same length. At least one-third of the foot should be inserted into the stirrup.

Stirrups should not be worn so long as to render the tread on them insecure, nor so short as to cramp the legs. In either case

the rider is to some extent deprived of the proper use of his legs as aids, and is not able to maintain a correct seat. The

Figure 58. The military seat; McClellan saddle.

position of the foot giving the greatest satisfaction is that which requires no muscular effort and in which the sole remains firmly

upon the tread of the stirrup when the horse trots. With the military seat as described, the rider should be able to bend the

Figure 59. The military seat, officers saddle, model 1916.

body forward, backward, or to either side without disturbing the grasp of the thighs or moving the feet.

While the rider should sit erect, all appearance of stiffness should be avoided, for rigidity of the rider is incompatible with the supple action of the trained saddle horse in motion.

When mounted bareback, or with the blanket and surcingle, the trooper sits in the middle of the horse's back with the same seat practically, the toes dropping naturally. It will be apparent at a glance that to keep the heel lower than the toes without a stirrup would involve much unnatural constraint, which, instead of adding security to the seat, would seriously impair its stability.

In long-continued trotting exercises on the ring or in the riding hall, without saddles, the tendency of the rider is to gradually work forward to the withers. In such cases the rider should place his hand or hands on the withers of the horse and move his body back to its proper place, for the rider feels less of the roughness of the trotting gait at the middle of the back than when seated near the animal's withers.

For military riding much uniformity is demanded at all times, and this circumscribes the variations of seat allowed to very narrow limits. The best way to secure this uniformity, which is desired not for the sake of appearances but for the cavalryman's legitimate performance of duty, is to arrange the saddle and stirrups so that the average recruit, when fairly instructed, will find it easier to sit properly than any other way.

The cavalry soldier is often compelled to stand in his stirrups in order to make effective use of his arms. It is therefore necessary to place the stirrups so that when the trooper rises he can do so without constraint to himself or disturbance to the equilibrium of the horse. This condition is best secured when the stirrups are placed only a short distance in front of the center of the saddle, for then the rider in rising does not have to move forward and can resume his seat with ease. Furthermore, no muscular action is required to keep the stirrups in position, since they support the legs in their natural fall.

When the military seat is once acquired the rider has better control of the horse than through any other seat which can be devised. If through fear or temper the horse swerves, the rider instinctively grasps the animal with his thighs, and the stirrups being directly below the seat, balance is not lost. If the horse stops suddenly there is no tendency to shoot over his head, as when the feet are stuck forward and the legs straight. If the horse rears, no time is lost in bringing back the feet and counter-acting the tendency to slip off over the cantle. In fact, every sudden or unexpected movement of the horse is better provided for in the correct military seat than any other, and the rider, appreciating the security afforded by it, is less likely to degenerate into dependence upon reins and stirrups.

The military seat described contains all the elements essential to successful riding, either for pleasure or service. It varies but little in the regular cavalry of all military nations, and the trooper marching upon active service, fully equipped, with a sure prospect of hard work and scanty provender, cannot vary this seat with the same impunity as the casual rider seeking recreation and exercise.

Confidence in the saddle depends much upon the first lessons. As soon as the stirrups are crossed, or the recruit mounted on the blanket and surcingle for the very prosaic operation of being shaken into a good seat, everything possible should be done to eliminate faults. Small, gentle horses, with easy gaits should be selected at first, but when sufficient confidence has been acquired to perform the mounted exercises prescribed for recruits, horses should be changed daily. Care should always be taken to avoid having beginners hurt or frightened by horses that fall over backwards, bolt or kick; such things are not easily forgotten. Many a good jockey has been ruined by the mental impression left after witnessing a bad fall, and any one who has personally suffered from an accident seldom recovers his courage for difficult riding.

It has been the custom in the American army to teach recruits to ride bareback, or with a blanket and surcingle, before allowing the use of a saddle. Inasmuch as the most difficult thing to attain is balance, and the stirrup was devised for the purpose of assisting in acquiring and maintaining it, it would seem not unreasonable to first teach the correct seat in the saddle and afterwards perfect it by riding without a saddle. For teaching a firm, close seat, and giving the recruit confidence in himself, nothing is as good as the trot without stirrups.

After acquiring a good seat recruits will be ready to take their chances in the ranks ; however, timid men should not be forced too fast or made to mount vicious horses, but left for time and their own ambition to overcome their fears.

If necessary to put men in the ranks for active service before preliminary instruction is completed, special attention must be paid to them, else they will become confirmed in their faults and resent later instruction because of having participated in a campaign.

The herding of the troop horses in the field is of great assistance in making bold cross-country riders of many otherwise timid men. If a recruit can be given enough confidence in his seat and horse to enable him to stay with a stampeded herd until the horses have recovered their senses sufficiently to be rounded up, there need be no fear of his not learning to ride.

A trooper whose seat is insecure almost invariably makes it manifest in the horse, which then becomes nervous and uneasy in ranks. The insecure seat causes the rider to constantly jerk or pull on the reins. When this fault continues it is often necessary to have the rider sit with folded arms, while another trooper, mounted, leads the horse at a trot around the hall or riding-ring for prolonged periods. This will compel the offender to learn to ride without depending upon the horse's mouth for support.

There is a vast difference between good riders and accomplished horsemen. Many of the former possess such secure seats that

the meanest of brutes cannot dislodge them from the saddle, and yet they may be unable to train or to appreciate a well-trained saddle horse. It is not merely the ability to stick on which should characterize the cavalryman. He should by all means be an expert horseman, and the more accomplished he becomes in that line the more valuable he will be as an example to others; increase of pride and self-respect will urge him on to perfection when he discovers his ability is recognized.

The average trooper requires a great deal of individual instruction to prevent him from contracting habits which spoil horses. It is a most noticeable fact that when a beginner gets tired and irritable he almost invariably jerks his horse to punish him for his roughness. If the horse stumbles he is given a vicious jerk long after any possibility of sustaining him has passed. If the squad be at a trot the horse is jerked to make him change his gait while the instructor's back is turned.

If the troop is ordered to trot, there will always be one or two men who will purposely keep their horses so excited that they will not trot. The only remedy is put to such men on steady old horses, that are well established in all the gaits, and punish them for any repetition of the offense.

There is a very common and unsightly fault which requires constant attention. This is the habit of curving the back and sitting on the lower part of the spine. This is usually accompanied by a drawing in of the chest and rounding of the shoulders. This position is utterly incompatible with proper military riding, and no effort should be spared to correct it. If it becomes apparent that ordinary admonition has no effect, it may be corrected by causing the trooper to hold a flat stick passed behind his shoulders, the ends, being held by the hands, opposite the shoulders, backs to the rear. This of course necessitates the horse being led by another trooper. Hump-backed riders, with insecure seats,

not only detract from the appearance of an organization, but are an actual detriment on the drill ground and the battlefield.

The military seat is prescribed with minuteness of detail, and while it may be impossible for all men to conform exactly thereto, it should be insisted upon in the cavalry as closely as possible. Many men after acquiring bad habits in riding, through ignorance or stubbornness, are quite apt to imagine that they cannot do what is desired of them.

It is not possible, under the conditions surrounding the remount system of the American cavalry, to perfect the training of all horses before assignment, as is done in some European armies, and therefore the necessity for making good riders of the men becomes paramount. In any event, after a single raid or battle, many remounts must be obtained, and if a trooper has to depend upon being supplied with a gentle, well-trained animal, he may prove a detriment rather than a valuable factor in his squad and troop. A good, firm seat should be demanded, and any trooper who cannot acquire it should be transferred to a dismounted arm of the service.

On the other hand, any horse which persistently refuses to perform his work in a gentle and reasonable way under the guidance of careful and selected troopers should be cast out. A horse with many blemishes and defects which will do his work honestly in ranks will render more efficient service under careful treatment than a sound and well-bred horse which keeps a trooper always engaged in trying to keep him quiet, and to preserve his own seat. In addition to worrying his rider, a nervous horse will annoy all the men and horses in his vicinity, and distract their attention from the performance of their legitimate duties. A horse should not be condemned, however, until it is assured that this nervousness is not caused by the insecure seat of the rider. Men who cannot ride, and horses which cannot be ridden and properly trained, are useless and expensive members of any cavalry organization.

CHAPTER VIII.

MODERN CAVALRY AND ITS EQUIPMENT.

American.—British.—German.—French.—Russian.—Austrian.—Japanese.

The organization of cavalry has undergone but little change within half a century, but modern battle experience has forced the general introduction of the carbine or rifle as the main arm of the trooper. While regiments maintain their distinctive historical designations as dragoons, hussars or lancers, the cavalry of all great powers has, for all practical purposes, assumed the rôle of dragoons.

In the reorganization of the American cavalry during the Civil War, the European model was abandoned and each regiment given the same organization, designation, arms and strength. The squadrons, which had previously comprised two troops, were organized with four troops and the number of squadrons in each regiment reduced to three.

British and European cavalry continue the small squadrons of two troops each, some regiments comprising four and others five squadrons. The Japanese cavalry is also organized on these lines following the German organization. With these differences of organization each American squadron on a war basis is nearly equal to a regiment of European cavalry with its depot squadron deducted.

In the American service the regiments of cavalry are all armed with rifle, saber and pistol, and equipped identically the same. There is no distinction as to heavy and light cavalry, and the horses are purchased as nearly as possible of an average size. The last year the weight of horses in service was taken, the average in ten regiments was 1052 pounds.

It is the heavy weight of trooper and equipment that causes the demand for horses averaging about one thousand pounds. This prevents the purchase of animals weighing from eight to nine hundred pounds, a class in which is found the greatest proportion of hardy saddle animals of fine conformation for cavalry service.

The troopers are enlisted only up to a weight of 165 pounds, and none but particularly good men are accepted at that weight. Men whose weight runs from 130 to 150 pounds are the best adapted for the requirements of American cavalry, the traditions

CANTLE

POMMEL

Figure 60. U. S. officer's saddle, model 1916.

of the service demanding a great degree of activity in dismounting to fight on foot, in skirmishing, and in remounting.

For some years past efforts have been made to produce a model of saddle which would contain all the essential elements demanded for cavalry service. None of the experimental models have as yet exhibited such superiority over the cavalry saddle known as the McClellan as to cause the abandonment of that saddle and the matter still remains unsettled.

The tree of the officer's saddle, model 1916 (figure 60), is made of the best grade of weather seasoned basswood. It is made with the extended bar known in the United States as the Colonial

bar. All steel parts are forged and riveted to the wood, no nails or screws being used. The pommel of the tree is made in what is known as the key type, insuring a solid tree which will outwear mortised or dovetailed trees. The strainers of the saddle are made of the best grade of flax webbing, two being stretched lengthwise of the saddle and three crosswise; over this is stretched a heavy cloth ground seat of No. 1 or No. 2 duck. The pads or panels on the under side of the saddle are built up of two thicknesses of felt, one being hard $\frac{1}{4}$ " felted felt, the other $\frac{1}{4}$ " woven felt. This is put in a mold and shaped to the form of the panel required. The calfskin covering is dampened and molded to shape before it is placed over the felt panel. This insures that no matter what the strain or hard usage this saddle is subjected to, the pads or panels will remain serviceable and will not wrinkle nor become hard or knotted as occurs where the hair stuffed pad is used. This panel is stitched on to the saddle through the tree and over it is put a heavy sweat leather. Between the sweat leather and the fenders or skirts are the three girth billets which are cut from the highest grade of leather. The skirts and jockey of the saddle are made of the best grade of oak tanned leather with hog impression. The seat and welts are made of genuine pigskin. The seat of the saddle is built up over the ground work with rolls on the side of the cantle seat, which makes it possible for the rider to sit up straight on the saddle and still be in a comfortable position. It is arranged to prevent the rider from sliding back in the saddle so that the cantle rubs the base of the spine. The saddle is intended to afford an unconstrained natural seat.

The McClellan saddle both as to form and material, is the result of half a century of experiments and service trials in campaigns extending over widely separated regions, involving extremes of cold and tropical heat.

The saddle-tree is made of wood, the pommel and cantle being of beech, each made of two pieces framed together at the top and glued. The two side bars of poplar are each made of two pieces,

and glued together; they are then glued to the pommel and cantle, and secured with screws.

Iron pommel and cantle arcs are fastened to the side bars with rivets; an iron pommel plate of semi-circular shape is fastened to the front of the pommel, and an iron cantle plate is fastened to the front of the cantle.

Two stirrup strap hooks made of wrought iron, with the lower edges inclined from the horizontal upward and to the front, are made to swing loosely in iron straps which are let in and fastened

Figure 61. Cavalry saddle tree before rawhide cover is put on.

to the side bars. The tree is smooth, and painted with white lead before the rawhide cover is put on to strengthen it (figure 61).

The top covering is secured in place with rawhide thongs passing through holes in front and rear of the pommel and cantle, and over the covering, and the top and bottom covers are sewed together with light thongs of the same material (figure 62).

The tree is then covered with fair collar leather. There are no leather skirts to the saddle.

Two brass rings are attached in the front ends of the side bars; a brass shield, with the size of the seat stamped on it, is fastened

on the pommel; brass guard plates or ovals are fastened on the cantle, and pommel over the mortises, for the coat straps. Two foot staples for coat straps, are placed on the front of the pommel and two carrying brass rings on the rear of the cantle. Two foot staples are fastened to the side bars through the rear girth straps

Figure 62. Cavalry saddle covered with rawhide.

half and twelve inches. The lengths of the bars correspond with the length of seat, but all the other dimensions are the same for all trees.

To form a cincha attachment, two quarter straps, made of harness leather, are passed over the pommel and cantle arcs, to which they are riveted; safes of leather are fastened under the rings to prevent sores from tight girthing; two cincha straps are sewed in these rings, one for each side.

The cincha is made of strands of hair rope knotted at the ends into iron rings with leather safes underneath.

The stirrups are of hard wood, five and one-half inches wide and four and one-half inches deep, with a hood of thick harness leather riveted on. Stirrup straps, without sweat leathers, are used with the stirrup.

Six coal straps are passed through the mortises and foot staples. Leather stops are riveted on to limit the play of the straps.

Figure 63. Trooper dismounted, showing near side of horse with McClellan saddle packed, with rifle in boot.

The long boot for carrying the carbine or rifle is hung under the left leg. This method throws a great deal of weight on the pommel, is not comfortable for the rider and interferes with the proper use of the left leg and foot, but it has been adopted because the long rifle with bolt action cannot be conveniently carried in the short carbine boot in rear of the right leg (figure 63).

When the rifle is carried in the long boot the saber is attached to the saddle on the right side by small straps, one of which passes through the rings on the front end of the bar and the other through the cincha ring.

Figure 64. U. S. cavalry saddle, near side, model 1912, showing method of carrying rifle.

The weight of the average kit and equipments complete is about ninety pounds.

The troopers provided with the experimental equipment known as the model of 1912 carry the rifle in a bucket, the muzzle of the

piece being passed through a belt ring, the snap hook of which is engaged in the trigger guard. Although the rifle is attached to the trooper the weight of the piece passes to the horse when the butt is placed in the bucket (figure 64).

In much of the wild country where American cavalry has been on duty for three quarters of a century the troopers were required to carry all they needed for a scout of thirty or sixty days, except rations, on their horses.

The McClellan cavalry saddle is of the same general form as that used during the Civil War and compares most favorably with those in use by the more prominent military nations as regards strength, durability, and packing capacity.

It has been in use for forty years, and has stood the severest tests of active field service that the varied climate and character of the country demanded. It must be placed to the credit of this saddle that when properly fitted and adjusted very few sore backs occur, and when through accident or carelessness a back is injured, it may be cured while continuing the horse in service by removing or rearranging the pack and so folding the blanket as to guard the bruised or wounded part.

The weight of the arms and equipments is practically the same for all troopers, therefore the strong horses are selected for the heavy men, in order that all the animals may have the same chance of withstanding the fatigues incident to field service.

The summer work is done frequently with a much reduced load, but in the severe weather of midwinter both the weight and bulk of pack are very great.

The total weight carried by the horse may be, and frequently is, increased by the addition of rations for the trooper and grain for the horse. It may be easily seen that the manner in which this load is secured is of the greatest importance.

The overcoat is tightly rolled and strapped on the pommel with three straps. The bed blanket and a suit of underclothes, tightly

rolled inside of the shelter tent with the nose bag slipped over one end, constitutes the cantle pack. When side lines are carried they are laid on top of this pack, the whole being secured to the saddle by three cantle straps.

The ends of the pommel and cantle packs are bent downward, the heavy articles put in the bottom of the saddle-bags, and the rifle and saber hung well down on the sides of the horse. The result of this combination is to keep the horse's center of gravity nearly as low as in nature, so that the saddle seldom has any tendency to turn, as would be the case if everything was piled upon the horse's back.

Figure 63 shows a cavalry horse, near side, with McClellan saddle, equipped for ordinary field service. The rolled lariat is hung to the near cantle ring by the snap, which is used to attach it to the halter ring when the horse is picketed, or by a small strap specially issued for the purpose.

When the troopers dismount the rifles are habitually removed from the boots. The saber remains attached to the saddle, but the rifle and pistol are always carried by the trooper when dismounted to fight on foot.

Cartridges and the pistol are carried on the belt around the trooper's waist. Extra ammunition, horseshoes and nails, rations, currycomb and horse brush are distributed in the saddle-bags.

No other nation has ever fought its cavalry on foot to such an extent as was done in America during the Civil War and since.

Several methods of securing the horses are provided for in the Cavalry Drill Regulations, depending upon whether they are to be left immobile at the place of dismounting to fight on foot or whether they are to follow up the advancing line or move to cover. The horses may be secured head and tail with their right sides together; or tied or held in a circle with their heads toward the center; or held by mounted troopers in column of twos or fours, ready to execute such movement as may be directed.

Figure 65. U. S. cavalry saddle, off side, packed, model 1912.

Figure 66. U. S. cavalry saddle, near side, packed, model 1912.

THE BRITISH CAVALRY.

The British cavalry is composed of dragoon guards, dragoons, hussars and lancers. All are armed with the rifle and saber, and the lancers, in addition, carry the lance. The equipment and accessories composing the pack vary according to the service, which

Figure 67. British cavalry saddle, showing covered ends of bars.

for this body of troops includes a wide range, because of the extent of the colonial system.

The British cavalry saddle (figure 67 and figure 68) is made with long wooden side bars of beech, and narrowed towards the rear ends, where they are covered with leather to prevent chipping. The front arch is of channeled steel, having slots for the

Figure 68. British cavalry saddle, side view.

wallet straps ; the rear arch is of beveled steel, with curved spoon cantle, both arches being riveted on to the side bars. The links or

Figure 69. British hussar with rifle on back, with butt of gun resting in bucket.

plates for attaching the stirrup leathers are placed on the side bars about three inches from the front arch.

The leather seat is laced to the arches, and supported underneath by broad webbing, crossed. Leather flaps, or saddle skirts, are secured to the side bars with screws.

Figure 70. British saddle showing long rifle boot or bucket.

Fair leather is used for both bridle and saddle. The girth is made of leather.

Since the South African war the British have been continually experimenting with a view to perfecting the armament and equip-

ment of their mounted forces. For a time the old method of carrying the carbine on the horse was abandoned, and the arm was carried on the trooper's back, with the butt of the carbine resting in a boot or bucket (figure 69). This new method was soon abandoned and a long boot or bucket adopted, in which, the carbine is carried on the right side and adjusted so that the butt projects to the

Figure 71. British packed saddle, near side.

rear of the trooper's elbow (figure 70). All British cavalry now carry the bayonet for use dismounted.

The manner of packing the kit and carrying the saber are shown in figure 71.

Wallets are attached to the pommel, over which is strapped the cloak and a pair of ankle boots, one on each side. In the

wallets are carried the horse brush, currycomb, underclothes, pipe clay, brushes, blacking, etc. The sheepskin in rear contains the stable jacket, trousers, gloves and picketing gear. The water bottle hangs under the right end of the sheepskin.

The pack appears to be snugly and tightly adjusted, and in the "light service order" it is reduced to a moderate limit.

The double-reined bridle with bit and bridoon is used, and a pipe-clayed halter rope takes the place of a leather strap.

On foreign service, where the field uniform is worn, "putties"—leggings—are used instead of knee boots. Efforts are being made to still further lighten the burden on the horse, which varies between 225 and 290 pounds, according to the weight of the individual trooper.

British officers have recently had opportunity to observe the value of dismounted fire action of cavalry armed with magazine carbines. Their South African experience has caused them to recognize as clearly as Americans, that horsemen do not cease to be cavalry because they can dismount and fight on foot. Target and skirmish records show that cavalrymen shoot quite as well as infantrymen, and in war they have never failed to charge mounted when circumstances justified it.

The work of the British cavalry on duty in the colonies is much like that of the American cavalry on the frontier, and their equipment and kit are carried in a somewhat similar way.

The horses are usually attached to the picket line in front and to the ground in rear by heel ropes. Whether this is better than the American plan is not known, but in either case constant watchfulness is necessary to prevent horses from injuring themselves by entangling their legs in the hitching ropes. It takes a long time for most horses to learn how to stand quietly at a ground picket rope, or when grazing attached to a lariat. By winding a rope about the heel a fine horse may in few minutes reduce himself to an utterly unserviceable condition, requiring weeks for re-

cuperation. A heel gall or rope burn is almost invariably followed by a rough, unsightly cicatrix. The difficulties arising from such accidents in the field, in addition to the wider range for grazing, induced American officers many years ago to teach all cavalry horses to herd whenever the proximity of the enemy did not prevent it.

THE GERMAN CAVALRY.

The German cavalry still retains the distinctive titles of cuirassiers, uhlans, dragoons and hussars, but the only difference between them is in the weight of men and horses. The cuirass has been worn only on occasions of ceremony during recent years.

In heavy cavalry, cuirassiers and uhlans, the average weight of the horses is 1083 pounds, and the troopers 187 pounds. In the light cavalry the horses average 866 pounds, and the troopers 143 pounds.

All German cavalry regiments are armed with lance, saber and carbine. Officers, first and vice-first sergeants and trumpeters do not carry the lance or carbine, but are armed with pistols. There is some variation in the saber issued to different regiments, but the lance is the same for all. It consists of a hollow steel tube with a four-edged point of forged steel and a shaft of cast steel. The length of the lance is ten feet six inches, and its weight is 4.36 pounds. The carbine is the same in all regiments.

Four patterns of saddles were formerly in use, but at the present time all the cavalry is equipped with the army saddle, which is made in five sizes to suit horses of different conformation. The smallest size is issued only for service in South Africa.

This saddle consists of a wooden tree with wooden arches, strengthened by iron plates and supported by angle irons. Between the arches is laced a leather seat. To the bars are attached panels stuffed with wool, and secured in place by pockets laced over the fans or ends of the bars.

The leather saddle-skirts, with knee pads stuffed with hair, are attached to the arches and also to the wallëts, which are strapped on the front or pommel arch.

The girths and stirrup leathers are attached by means of D's on the bars. The stirrups are made of steel. A breast strap is used. All the horse equipments are fair leather.

The saddle is made in pieces and, with the exception of the tree, may easily be taken apart and put together. The various parts are numbered according to the size of the saddle, and when worn out or damaged can be replaced by the trooper without the aid of tools.

All cavalrymen excepting the cuirassiers are furnished with leather surcingles for use over the schabracks for ceremonies.

The saddle blanket is of wool, usually white or gray, and folded from nine to twelve times. Regimental commanders are allowed some latitude in making minor changes in accoutrements.

Picket lines are prepared from lariats. Hatchets, spades and materials for demolition of bridges, etc., are distributed in each squadron.

The weight of arms and saddle equipments is about sixty pounds, and the clothing and other articles of the trooper's kit will average more than forty pounds. The total weight carried by the horse, exclusive of rider, will, therefore, seldom be less than one hundred pounds.

The method of attaching the carbine indicates that it is secured in place before the trooper mounts. The wallëts are attached to the pommel by four straps, and the overcoat and grain bag are carried in rear of the cantle. The illustrations (figures 72, 73 and 74) are made from photographs of a trooper of the First Dragoons of the Guard and show the method of adjusting the saddle and pack. The carbine is carried in a leather boot attached to the right side of the saddle. The boot is also attached to the

Figure 72 Front view, mounted German trooper, Dragoons of the Guard.

right girth strap to steady the carbine, which hangs perpendicularly. When mounted the carbine is habitually carried in the boot, but the trooper is furnished with a sling to carry it across the back for dismounted duty. The saber is attached to

Figure 73. Near side view, mounted German trooper, Dragoons of the Guard.

the left side of the saddle and balances the carbine to some extent. For dismounted duty the trooper attaches the saber to his belt. The cartridge box seen behind the back is hung from the shoulder belt, and contains thirty cartridges. The left wallet has a small

pocket in the front, in which are carried thirty cartridges. The horseshoes are strapped on the outside of the wallet. The white end of the grain sack and the overcoat are seen just above the leather case containing the cooking vessel, which is hung from

Figure 74. Off side view, packed saddle, German dragoon dismounted.

the cantle on the left side. The lariat (no picket pin) is coiled grummet fashion and hung from the right side. The halter strap is rolled and tied at the left side of headstall. The field kit or pack is not carried during ceremonies, drills or garrison duties.

It is presumed some arrangement exists for securing the lance to the horse when the trooper dismounts, for it is well recognized in the American service that the horse-holders must follow up an advancing line, or take the horses back to cover when a defensive line is to be held.

It is a question whether the German equipment does not indicate that they are divided as to cavalry lessons, and that they have attempted to satisfy both the admirers of the lance and those who recognize that fire action is a necessary accompaniment to successful raiding columns as well as to perform the other important functions of cavalry.

No blanket, shelter-tent or cover appears to be included in the German cavalryman's equipment. This makes it absolutely necessary to billet the men, which involves scattering them about villages in a way which is not conducive to cavalry success, although it may be entirely applicable to infantry. It would not be practicable in America to campaign without baggage wagons unless some blankets or shelter-tents are carried on the horses. The system of billeting may do away with this necessity in Europe, but it would never work in America.*

*During the Civil War several general and many subordinate officers learned by bitter experience that they were not safe billeted in houses, even in the midst of troops. A notable occurrence was the capture of General STOUGHTON while asleep in bed at the house of Dr. GUNNEL, in Fairfax Court House, Va., several miles within the Federal lines. This was accomplished by MOSBY, who, with his men, passed through the picket line in some heavy pine timber during a dark and rainy night. The guards on the streets were approached under the guise of patrols, and all were captured without firing a shot. A captain and a number of men were captured, and also nearly sixty animals, many of them being officers' horses. A number of individuals were captured in this way during the progress of the war, among them being the late Major-General CROOK.

THE FRENCH CAVALRY.

The French cavalry is composed of dragoons and light cavalry. All are armed with the regulation carbine and saber. The dragoons carry the lance in addition to the carbine.

At the last weighing of the French cavalry the average weight carried by the horses was for dragoons, 256.88 pounds, and for light cavalry, 235.93 pounds.

The French saddles are a trifle heavier than those of several other prominent European armies, and are considerably heavier than those used by the American cavalry. The saddle consists

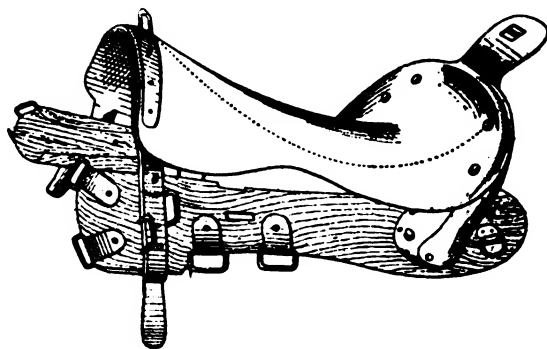


Figure 75. Saddle tree, light cavalry, French.

of a combination of wood and iron, the bars and cantle arch being of wood and the pommel arch of iron. The girths, stirrup and breast straps are attached by means of D's on the bars. The tree is completely covered with a leather seat. Leather skirts are attached to the bars of the saddle. Breast straps and cruppers are used. The stirrups of steel are without hoods. The saddle blankets issued weigh practically the same as the American cavalry blankets.

The saddle-tree and the saddle complete of the light cavalry are shown in figures 75 and 76. The padded panels are in accordance with European ideas of saddlery.

The carbine is carried on the trooper's back (figures 77, 78 and 79). A bandolier of cartridges is carried around the horse's neck. Hand grenades are carried on going into action.

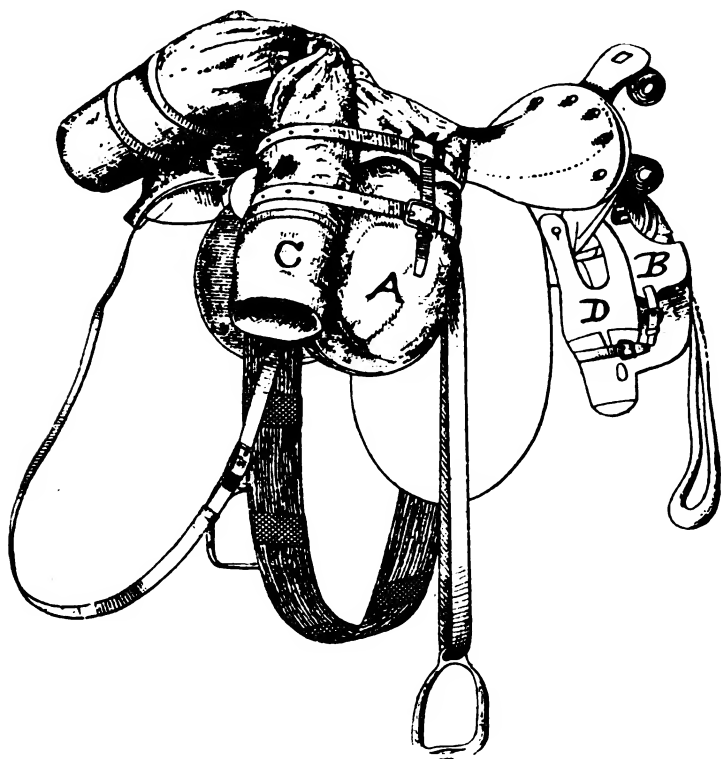


Figure 76. Saddle complete, light cavalry, French.

The saddle-bags (*A*, figure 76) are carried across the pommel and the small horseshoe bags (*B*, figure 76) are attached in rear of the cantle. The cloak is tightly rolled and strapped to the cantle, and the forage sack (*C*, figure 76) is strapped in front of the

saddle-bags. The saber is carried in the leather loop (*D*, figure 76) formerly attached to the left side of the cantle, but is now carried on the right side to make room for the bayonet.

Independently of the rations on regimental trains, each trooper



Figure 77. French dragoon in full dress.

is required to take at departure two days' rations of bread, two days' miscellaneous provisions, one day's ration of preserved meat, one ration of condensed soup and one and one-half days' rations of grain for his horse.

Reliance is had on billeting ordinarily but each trooper carries one section of shelter-tent of which six are necessary to complete the tent. The forage wagons of each squadron carry complete shoeing outfits and spare shoes.

Figure 78. Sapper, French chasseur, equipped with axe.

Articles of special equipment for use in destroying bridges, felling timber, demolitions, etc., are distributed to selected men who have been especially instructed in the use of modern explosives and their application to the destructive purposes of war.

Two automatic rifles with ammunition are carried on led horses by each platoon. Two sections of heavy machine guns, four in all, on carriages drawn by six horses, accompany each regiment.

The analytical investigation of the horse has been a favorite

Figure 79. Near side, French chasseur, mounted.

study in France for three hundred years, and it has resulted in much technical knowledge which has been brought into use in establishing the remount system for the nation in arms. Everything tends to encourage breeders, who are allowed to deal directly with the purchasing officers and are, thereby, assured

the highest possible reward for raising acceptable horses. There is much food for reflection by American officers in the regulations of the general remount service of France, as well as the methods of horsemanship and horsemastership taught at the French Cavalry School at Saumur.

THE RUSSIAN CAVALRY.

The Russian cavalry is composed of cuirassier, uhlan, hussar and dragoon regiments, the greater portion having the last-named designation.

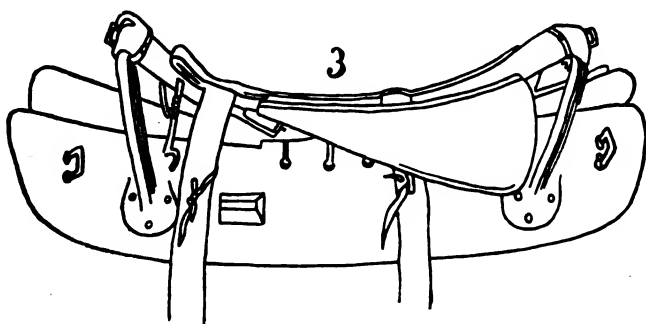


Figure 80. Russian cavalry saddle tree.

The non-commissioned officers and privates are armed with the saber and rifle with bayonet. Trumpeters carry the saber and revolver. The rifle is carried slung over the back, muzzle in rear of the left shoulder, and the saber is also attached to the person of the trooper.

The Russian cavalry saddle is made with somewhat larger side bars than the usual military saddle, but the arches are very light. The arches forming the pommel and cantle are riveted to the side bars, and are connected together by a strap which supports the cushion or seat. Figure 80 shows the tree; the staples seen near the ends of the side bars are for attaching the straps to secure the front and rear packs.

Felt pads are placed under the side bars, being held in place by a pocket over the front and a strap around the rear end of the bars behind the cantle arch.

Figure 81 shows the saddle packed for service. No. 1 is the

Figure 81. Russian cavalry saddle complete.

cushion or seat ; 2, the skirt ; 3, the stirrup strap ; 4, 4, the saddle girths ; 5, the saddle cloth ; 6, the overcoat ; 7, the picket-pin ; 8, the saddle-bags ; 9, the kettle ; 10, the horse blanket ; 11, 11, the pack straps ; 13, the breast strap.

The saddle-bags, carried in rear of the cantle, contain the rations and personal articles not strapped to the saddle.

Figure 82. Russian dragoon, near side, equipped for field service.

The total weight of the Russian cavalry equipment, including the rifle or carbine and thirty-six rounds of ammunition, is about

Figure 83. Russian dragoon, off side.

120 pounds, and the estimated weight of the soldier is 167.4 pounds. This makes the total weight carried by the horse about 288 pounds.

Figure 84. Russian hussar, equipped for field service.

Figure 82—copied from a photograph taken at the Officers' Cavalry School—shows a Russian dragoon equipped for field service, and figure 83 shows the same trooper on the reverse side.

Figure 84 represents a Russian hussar equipped for campaign, and figure 85, illustrates a Cossack of the Imperial Guards, a type

Figure 85. Russian Cossack of the Imperial Guards.

of irregular cavalry peculiar to the Russian army. The Cossacks are habitually equipped with the lance.

THE AUSTRIAN CAVALRY.

The Austrian cavalry, like the German, is divided into dragoons, hussars and lancers, but all are similarly armed and equipped, the only difference being in designation and uniform. The troopers are armed with the saber and a magazine carbine, which they are taught to use on foot.

The Austrian cavalrymen enjoy the reputation of being excellent riders and are mounted upon a good class of saddle horses. Men and horses are both comparatively light; there is no distinction as to light and heavy cavalry.

The interests of the arm are cared for by the Inspector-General of Cavalry and the Cavalry Bureau, which is specially charged with all matters pertaining to the personnel and material of the cavalry branch.

The saddle-tree and cover are shown in figure 86.

The saddle-tree is composed of two wooden side bars, to which are riveted a wooden pommel and cantle, the cantle being somewhat longer than the pommel.

The side bars contain holes for the stirrup straps, and also small holes through which the ties pass for fastening the girth to the saddle-tree. The bars are encased in felt covers with leather corners. The pommel and cantle are connected by a piece of leather, upon which the leather seat rests; the seat and skirts form one piece, which is fastened to the pommel and cantle by thongs. The flaps have holes through which the stirrup straps pass. The girth is of two pieces of leather fastened to the side bars and with a buckle on the longer piece. The surcingle, also of leather, is fastened over the saddle. Heavy steel stirrups with a broad tread are used.

The saddle is comparatively light, and the seat is high enough above the horse's back to admit of a good circulation of air. Careful attention is paid to fitting saddles, and fifty with adjustable side bars are allowed each regiment for special cases.

Figure 86. Austrian saddle and cover.

The simplicity, dimensions and general shape of the saddle-tree commend it for military purposes.

A black leather breast strap is used, but no crupper.

The saddle blanket is about five feet square, folded in six folds. The saddle is prevented from slipping by the felt pads on the side bars.

Figure 87. Austrian trooper equipped for field service.

When the trooper is equipped for field service (figure 87). reserve rations for three days, the clothing and personal kit are carried in the wallets.

A horseshoe pouch of leather is fastened to the left side of the saddle near the cantle. A wooden picket-pin, with an iron point and ring, is carried.

A forage sack is fastened at the middle of the cantle.

A telescopic canvas water bucket, the cooking utensils and eating tin are also carried on the saddle.

The carbine is carried slung on the trooper's back, butt down, and muzzle opposite the left shoulder.

The average load carried by the horse, including trooper, equipments, rations, forage, and a share of the tools, weighs more than 297 pounds.

THE JAPANESE CAVALRY.

An examination of the history of any great war, with special reference to the causes of failure, not infrequently develops that lack of full success may be fairly attributed to a deficiency of cavalry or an improper employment of that arm, the character of the country within and adjacent to the theater of operations and the national traits of the combatants being duly considered.

In the struggle between Japan and Russia, the theater of war included much country favorable to the operations of cavalry.

The Japanese army entered Manchuria with a very small mounted force, not equal in strength to an American cavalry division. The men were not good horsemen and the ponies, while hardy and capable of enduring much exposure and fatigue, were in no sense a proper mount for the work to be expected of cavalry in a field of action so peculiarly favorable to an enterprising force.

From the nature of their country the Japanese have had comparatively little use for horses in the past, and at the commencement of the war there was no reserve of men, accustomed to the use of horses, to draw upon.

The Japanese cavalry organization and method of instruction are based on the German system. The cavalry comprises only one

class which, by reason of the size of the horses, the average weight of which is 752 pounds, would ordinarily be called light cavalry. This term is used in Europe to designate a body of horsemen mounted upon small active horses of a class entirely different

Figure 88. Japanese trooper showing method of carrying rifle and saber.

from the heavy necked Mongolian and other Chinese ponies which constituted so large a proportion of those used by the Japanese.

The trooper is armed with a rifle, which is carried on his back, and a saber which is also carried on the person of the trooper (figures 88 and 89).

The saddle used is of a pattern differing but little from that of Germany.

The total weight of the average trooper, with his arms, saddle and equipments, is 255 pounds, or about one-third the average weight of the horse.

Figure 89. Near side view, saddle (packed), Japanese trooper.

The Japanese discovered very early in the campaign that they were seriously hampered through their deficiency of cavalry and undertook to import horses and build up the army during the progress of the war. A medium sized Australian horse averaging from fourteen to fifteen hands in height, both active and hardy, was selected as a type and nearly fifteen thousand were delivered before the close of the war. In the reduction and reorganization

consequent upon the close of hostilities the Australian horses and the best of the ponies were retained for the cavalry and field artillery.

A remount depot and officers' school combined is intended to afford the means of disseminating a uniform system of equitation

Figure 90. Off side, Japanese trooper mounted.

and horse training for the cavalry. The new type of cavalryman, toward which the Japanese are bending their efforts, is shown in figure 90.

To obtain a uniform supply of such horses it will be necessary to undertake horse breeding in Japan on a much larger scale than has heretofore been known in that country or to absolutely control the sea route for future importations.

It is observed that the British and German cavalry carry the carbine or rifle on the horse, while the practice in other foreign armies is to have the gun carried on the trooper's back. Theoretically, the slinging of the carbine over the shoulder and strapping it snugly to the back is the best way for the gun, as well as for the horse. In this position the carbine is not liable to injury, and is always with the trooper when he dismounts, no time being lost in detaching it from the saddle. It is very much harder on the trooper, the fatigue being doubly severe whenever the trot is taken. The horse has to carry the weight whether it is on the man or the saddle. Everything being considered, Americans prefer not to put the weight on the trooper, for the fatigue occasioned by carrying a gun across the back all day is apt to produce lounging in the saddle, which, in the end, is more disastrous to the horse than if the gun is hung in some manner from the saddle.

Sabers are carried on the person in some armies and attached to the saddle in others. A saber suitable for a mounted man is an encumbrance to him on foot, and should always be attached to the saddle. In this position it makes but little noise compared to that produced when hanging from the trooper's waist.

There is not much difference between the equipments and kits in the various armies as to weight, but there are many varying opinions and customs regarding the distribution and adjustment of the packs. Many little things which appear trifling may have great bearing upon the comfort and endurance of both men and horses, and these in turn exercise great influence on the success of campaigns.

CHAPTER IX.

ENDURANCE OF HORSES.

Influence of the Weight of the Pack.—Husbanding Strength of Horses.—Abuse of Horses.—Marching Gaits.—Endurance Varies With Treatment, Size and Shape.—Causes of Losses of Horses in War.—Cavalry Raids.—Losses of Horses in Various Campaigns.—The Cavalry Bureau, and What It Accomplished.—Frontier and Foreign Service.

The cavalry of all nations is weighted down with heavy saddles, arms and equipments. The enormous loss of horses, resulting from service under such conditions, makes it imperative to prevent unnecessary waste. When not in the actual presence of the enemy, where troopers are liable to be detached at a moment's notice, it would increase efficiency and be vastly more economical to attach light wagons to every cavalry command to relieve the saddle animals of all extra weight. This would save the horses until the theater of operations is entered, at which moment every strap should be in place, for the "ears and eyes" of the army would be untrue to its traditions if it failed to be ready to gain contact with the enemy, whom once encountered, should never be lost sight of until success is achieved.

For the few brief charges upon the field of battle, into which the excitement of the moment may carry the sick and the lame, there must be months and years of patient and laborious work in reconnaissance, patrol, advance and rear guard, outpost duty, and route marches with horses loaded down with heavy and unwieldy packs. Few men upon first entering the service can realize how accurate a balance is required for the large amount of baggage and kit placed upon the horse.

Experience gradually teaches the trooper that the more he packs on his horse the greater will be the chance of breaking him down, but stringent orders are necessary with all recruits on service to compel them to leave in camp or quarters all but the necessary and authorized articles.

While the weight of the pack does not appear, under ordinary circumstances, to diminish the rate of speed upon the march, it necessarily augments the fatigue of the horse, and ultimately tends to reduce his length of service. When it becomes imperative to march at a faster gait than a walk for several days, it is customary to reduce the weight of pack to its lowest limit, and to secure that remaining in such a manner as to prevent it from swaying about.

On long marches, where grain is hauled in wagons and there is no danger of being suddenly ordered to abandon the train, it is advisable always to save up the horses by loading the bulky portions of the pack in the wagons as the grain is fed out.

It is not, however, always the pack and the legitimate work of cavalry which breaks down the horses and renders them unserviceable. Many fat horses are started on the downward road by being galloped about in an excited manner by couriers, who form exaggerated ideas of the importance of the messages they bear. This applies especially when ordered to take the field suddenly after prolonged garrison service.

All soldiers of experience know well the value of carefully husbanding the strength and wind of horses at the start. Many men have been compelled to lead broken-down horses, or pack their saddles and equipments into camp on foot, because of uselessly worrying fresh horses when getting ready for the march.

It is folly to imagine that horses can be put through any preliminary training or hardening process which will enable them to undergo the hardships of campaigning, unless provided with sufficient food and properly cared for on the march.

Many instances are recorded where the horses, not of pickets and vedettes, but of large bodies of cavalry, were kept saddled and bridled for days at a time in anticipation of immediate service. This practice cannot be regarded as otherwise than criminal in a properly instructed command.

A few saddles removed at a time, the horses allowed to roll and then groomed, the saddle blanket shaken out and refolded, and finally a good brisk hand rubbing of the legs, would not be dangerous to the command if vedettes were properly posted; to the tired horse it would be just such a boon as comes to the invalid when his bed is aired and made over after a serious illness.

The greater part of cavalry marching is done at a walk. When in the enemy's country it is necessary to give time for the advance parties to send scouts out in all directions, and allow the foraging details to collect supplies and bring them to the line of march. When traveling with convoys a faster gait than a walk would leave the trains unguarded.

When circumstances do not prevent, the present plan in the American service is to alternate the march at a walk with the moderate trot. This brings the command to the end of the journey in much less time, and admits of the heavy weight being removed entirely from the horse, so that he may rest and graze. This method also obtains in other services, and experiments made in marching at various gaits indicate that the combination of walk and trot is the best for cavalry.

The endurance of horses varies, not only with the treatment accorded to them, but also with regard to their size, shape and adaptability for service. An army whose ordinary losses do not demand more than 12 per cent of remounts each year may be considered fortunate. It has been estimated that cavalry horses last about two years longer in some countries than in others during ordinary peace conditions. It is very difficult to obtain reliable data on such a subject, but it is apparent to the most casual student that any system which procures two years longer service, on an average, from its animals than is obtained under other systems is worthy of investigation. It is not only a question of the military estimates from an economical standpoint, but also that a continuance in the ranks of trained horses saves much valuable time otherwise consumed in training remounts.

Exhaustion, over-exertion, starvation and extreme heat are responsible for a very large proportion of the losses of army horses. Direct manifestations of these conditions are usually discernible, but there are many affections of a serious nature not so readily diagnosed.

The loss of animals in all wars is very great, and occasionally the average is much increased by occurrences of an unusual nature. The situation at Chattanooga, when the Army of the Cumberland was besieged after the battle of Chickamauga, may be placed under this category. There was absolutely no forage for the animals; they ate bark, wagon bodies, one another's manes and tails, and those not used for food by the half-starved troops finally succumbed to starvation at the picket lines.

In the Army of the Potomac, where every pound of supplies had to be brought by sea or rail from Northern farms, it is not difficult to understand how it happened that many detachments even regiments, were left unprovided for at times. Constant exposure in rain and mud caused much disease; at one time nearly all the cavalry horses were laid up with scratches and grease heel, brought on by unsanitary surroundings.

In the early part of the Civil War the demand for horses to mount the newly organized cavalry regiments was very great, and as the majority of people supposed that the war would be of short duration, considerable carelessness prevailed in the selection of horses. Thousands of animals utterly unfit to take part in the fatigues and exposure of campaigns were hurried into service, with the very natural result that they soon died or became a burden upon the government.

The records of the volunteer cavalry during the Civil War are not sufficiently accurate to base any conclusions or comparisons as to the endurance of trained animals in the hands of regular soldiers, such as exist in large numbers in European armies. They do, however, give an idea of just what may be expected

whenever a large number of volunteers are put into the field upon untrained horses.

General MEIGS commented upon this subject in his report as Quartermaster-General in 1862 as follows:

"Ignorance and carelessness of raw soldiers waste our horses, but it is believed that the quality of the animals supplied is quite as good as in any other army.

"After every battle and every considerable march great numbers of horses are turned into the depots as disabled, and urgent requisitions are made upon the department for remounts, as essential to the efficiency of the troops. Of the disabled horses many die; many prove on inspection to be incapable of recovering in such time as to be worth the expense of keeping them; these are sold. Those which by good feeding and careful attention can be recruited are kept in the depots, and issued for use in the army when again fit for the service.

"The reports and returns received from the *new and inexperienced officers, who, from necessity, have been employed in this department*, are too irregular and imperfect to give, at this time, a perfectly accurate statement of the number of horses and mules purchased and issued to the army during the fiscal year. The consumption of horses has been very great."

When it is considered that each cavalryman in the Confederate army was compelled to supply himself with a horse, without recourse to the government, the number supplied to the Federal army surpasses all belief.

There were purchased during the fiscal year ending June 30, 1864, 188,718 horses; captured from the enemy and reported, 20,308. Leaving out of consideration those captured and not reported, it is observed that the army required more than 500 horses each day for remounts; and this is the measure of destruction of horses during the same period.

Notwithstanding his opinion, that "as the cavalry has improved in discipline and knowledge, it is believed the horses last longer," the Quartermaster-General again called attention to the great loss of horses in the following language:

"During the first eight months of the year 1864 the cavalry of the Army of the Potomac was supplied with two remounts, nearly 40,000 horses.

"The supply of fresh horses to the army of GENERAL SHERIDAN during his late campaign in the valley of the Shenandoah has been at the rate of 150 per day."

Such data as can be obtained leads to the conclusion that much of the loss of horses in the Army of the Potomac during the first two years of the war was brought about by mistaken ideas as to the proper use of cavalry. The amount of picket duty performed by mounted men was out of all proportion to their numbers or to the necessities of the service. Worn out troopers, lounging in muddy and frozen saddle kits, on half-starved horses, characterized the outpost duty of the army during the winter of 1862 and 1863.*

Cavalry raids were inaugurated by the Confederates for the purpose of carrying the war into the territory of the enemy, thus cutting lines of supply and forcing undesirable concentrations of troops. These raiders lived off the country, and returned to their lines laden with booty, and accompanied by a plentiful supply of fresh horses captured from the enemy.

As the Federal cavalry became trained to its work, raiding columns were sent into various parts of the South; many of

*The sixth regiment of regular cavalry was encamped near Falmouth, Va., for four months performing outpost duty, and when ordered to march on the resumption of the campaign, April 13, 1863, it was necessary to leave 300 men in the dismounted camp, notwithstanding strenuous exertions had been made to keep the regiment mounted. It is probable that like proportions obtained in other regiments in that army.

them, particularly those penetrating to the rear of LEE's army, found the conditions very different from those attending Confederate raids, for there was little or nothing left in that region. These raids tested the powers of endurance of the horses to the utmost limit, and were responsible for an immense loss of animals. Raiding, however, became accepted as a thing of recognized value in the art of war, and the full accomplishment of mighty ends was regarded as value received for the thousands of exhausted and dead horses that marked the routes of march.

Although the weight of packs carried on these raids was always fixed as low as possible under the extraordinary circumstances surrounding them, the horses were weighted beyond their capacity, ridden beyond their powers of endurance, fed mostly on green corn fodder or "roughness," and used up generally in the accomplishment of the great ends for which the columns were set in motion.*

The loss of horses alarmed the government for fear it would be impracticable to keep up a numerous and well-equipped cavalry, and the organization of new cavalry regiments was discouraged. It required the utmost efforts of the Cavalry Bureau to remount the regiments already enlisted in the early days of the war.

It requires careful training and much experience to develop officers capable of handling, economically, brigades, or even regiments of cavalry. A corps of volunteer infantry can be organized and put in the field fit for any duty before a single,

* Although WILSON's expedition to Selma, Ala., with a body of 13,000 horsemen, was through much of the South which was depended upon to furnish supplies to the Confederate armies, each trooper was ordered to carry, in addition to his ordinary kit, five days' rations, twenty-four pounds of grain, 100 rounds of ammunition, and two extra horseshoes. This enabled them to pass across a strip of country which had been devastated by both armies. The raid was entirely successful, and culminated in the capture of the ex-President of the Confederacy.

strictly volunteer, regiment of cavalry can be made ready to perform mounted duty without great waste of horses and property. The following letter written at a critical period of our national history, tells its own tale:

WASHINGTON, D. C., February 13, 1865.

Lieutenant-General Grant, City Point:

GENERAL:—As the time is approaching for organizing the cavalry for the spring campaign, I forward the following items in regard to its conditions and wants, collected by the Cavalry Bureau, to January 1, 1865.

Cavalrymen present for duty	105,434
Cavalrymen present and absent	160,237
Cavalry horses serviceable	77,847
Cavalry horses unserviceable	9,659
Cavalry horses purchased during the year	154,400

The number expended has been much greater than this, as the cavalry force has been less than the previous year, and moreover, a considerable number of team and captured horses have been issued to the cavalry, and also recuperated animals. The expenditure of cavalry horses during the year has probably been less than 180,000. The waste or loss of cavalry equipments during the year is estimated as follows: Carabines expended, 93,394; pistols expended, 71,000; sabers expended, 90,000; horse equipments, 150,000. Expense of cavalry in horses, pay, forage, rations, clothing, ordnance, equipments, and transportation, \$125,000,000, is certainly a large sum for keeping up our cavalry force for one year. In regard to particular commands, there are in the Armies of the Potomac and the James about 10,000 mounted men, and in the Middle Division, under General SHERIDAN, about 12,000, which can be kept efficient by issue from here, except in case of extraordinary casualties. General SHERMAN has with him in the field about 6500 men, which, since he left Atlanta, he has kept mounted by captures from the enemy. In the Department of the Ohio (now Kentucky) there were issued to General BURBRIDGE for his Saltville expedition 6000 horses. On his return 4000 were reported lost or unserviceable. When HOOD commenced his march against Nashville General THOMAS' immediate command had only about 5000 effective cavalry, but between the 1st of October and 31st of December all horses purchased in the West were sent to his chief of cavalry, the issue amounting to 23,000, and including those sent to General BURBRIDGE during the same period, 29,000, in three months to General THOMAS' entire command. As Generals WILSON and BURBRIDGE have

made requisition since that period for 14,000 additional horses, it is presumed that about the same number were lost or disabled during that period of three months.

* * * * *

In regard to the enormous surplus of cavalry in the Western and Southwestern armies, as compared with infantry, I would remark that it has resulted in a great measure from the repeated requisitions of Generals ROSECRANS, BANKS and others for increase of mounted forces, and their mounting infantry as cavalry. They were repeatedly informed that so large a cavalry force could not be supported, and experience has placed this question beyond a doubt. Moreover, no general can command and efficiently employ, in our broken and wooded country, a body of cavalry of more than 10,000 or 12,000 men.

* * * * *

The *mounted infantry* and *militia* in Kentucky and Tennessee have destroyed a vast number of horses without rendering any effective service in the field. The same remark is partly applicable to the *mounted militia* in Missouri.

* * * * *

General WILSON wants 10,000 additional remounts for the spring campaign. It is certain that so large a number of remounts cannot be supplied to that army, even if we make no further issue to other cavalry troops supplied from the West.

* * * * *

Moreover, I learn from the Quartermaster-General that he is now some \$180,000,000 in debt, and that unless more money is soon raised it will be very difficult to purchase supplies for the army.

* * * * *

It is also proper to determine when the purchase of remounts shall be resumed for SHERIDAN and the Armies of the Potomac and the James. Considering that the Quartermaster's Department cannot now supply forage to the animals we have on hand, I would not advise purchases to be commenced before the middle of March, and I doubt whether navigation will be sufficiently opened by that time to enable us to bring forward horses and supplies. The railroads of the North cannot do this.

Very respectfully, your obedient servant,

H. W. HALLECK,
Major-General and Chief of Staff.

In this connection it appears proper to cite a few instances from the experience of other nations, in order to show that the loss of horses during the Civil War was not the result of wanton waste, but that much of it should have been expected in accordance with the teachings of history.

As has been stated, the loss of horses arises from a variety of causes, those killed in battle being but a small percentage of the whole. Forced marches, periods of great privation, and epidemics, occur at intervals to raise the ordinary average, and these causes must always be counted upon as exercising a marked effect in every campaign, no matter where the theater of operations may be.

THE RUSSIAN CAMPAIGN. 1812.

During the Russian campaign the French crossed the Niemen in June, 1812, with cavalry, artillery and train horses to the extent of 187,121; about 60,000 of these pertained to the cavalry. Up to this time it had been very hot; an unprecedented rainfall commenced and in a few days the roads became almost impassable, and there was little or no food for the horses. Ten thousand horses were left dead between the Niemen and Wilna. The only food to be had for the large number of animals with the army consisted of young, growing crops of wheat, rye and barley. Such food is calculated to produce weakness, and intestinal troubles of a grave nature, and this was without doubt the cause of most of the loss.

MURAT states that half the cavalry perished around Moscow in their search for supplies. It was not the horrors of the icy retreat which used up the animals, for NAPOLEON caused BERTHIER to write to VICTOR on November 6, that the cavalry was unhorsed; in all 92,000 horses had succumbed before the first fall of snow.

On December 13, the remnant of the invading army recrossed the Niemen with 1600 cavalry. In six months the horses had

all disappeared, and there is ample evidence that this was not the result of cold, but of starvation, aggravated, perhaps, by cold towards the end of the campaign.

RETREAT TO CORUNNA—PENINSULAR WAR.

This retreat was carried out in rain, ice and snow, over mountain roads. The food supply was not abundant, but the chief cause of loss was the want of horseshoes and nails. There was plenty of iron, but no time to perform the work of making shoes by hand.

After all the perils and suffering of the retreat, those horses which survived and reached Corunna were put to death on the beach to prevent them from falling into the hands of the enemy, there being no room for them on the transports. About 2300 horses constituted the loss.

MASSENA'S RETREAT FROM PORTUGAL.

MASSENA retreated from Portugal with 8000 horses. During the ten days occupied by the retreat the total loss was 1955, or 195 each day, being over twenty-two per cent of the whole number.

AFGHAN CAMPAIGN. 1838-39.

There was not a large number of cavalry horses employed in the first Afghan War, but the loss was nearly sixty per cent. The loss of pack animals from starvation was very heavy, and has caused the Bolan Pass to be well remembered in the British service. The animals were worn out by a long march and bad water, and being entirely dependent upon grazing for food, the loss amounted to 20,000 animals before reaching Candahar, and more than 30,000 for the campaign.

In the second Afghan War (1878) the loss of pack animals during a period of six months was 9496 out of a total of 13,840 on the returns.

CRIMEA. 1855.

All sorts of excuses have been made for the losses in this campaign, but the melancholy fact remains that the horses were starved to death. During a period of six months the loss of transport horses was thirty-eight per cent, and out of 5048 cavalry and artillery horses there remained at the opening of spring 2258.

ITALIAN CAMPAIGN. 1859.

During the campaign in Italy the Emperor, NAPOLEON III, ordered a cavalry commission to investigate the circumstances which had reduced the cavalry to a comparative state of inefficiency. It transpired that on May 20, 1859, the French cavalry had 9008 effective horses, which number was subsequently increased by the arrival of a brigade; so that on the 24th of June, the date of the battle of Solferino, the total number of horses borne on the returns was 10,206. On the day of the battle it was found that only about 3500 horses were in the ranks fit for duty. The remainder had been disabled by less than a month's marching, and an immense proportion of these had been rendered unserviceable by the saddle and other portions of the equipment.

BOHEMIA 1866.

During the brief campaign of a few weeks in Bohemia in 1866 the Prussian cavalry suffered a loss of 4226 horses, that being about seventeen per cent of the whole number in the campaign.

FRANCO-GERMAN WAR. 1870.

The official returns of the German army show only the loss of horses in action; that is, killed, wounded and missing. No returns are given of those which died from diseases, but as the army received a supply of 38,000 horses during the campaign, besides the animals captured or impressed by detachments to re-

place broken-down horses, and not reported, the loss from disease may be assumed at not far from 30,000. The number killed, wounded, etc., was reported at 14,595.

EGYPTIAN CAMPAIGN. 1885.

The total strength of horses for all branches of the service landed in Egypt was 5000, of which one-eighth died or were destroyed. The loss in the cavalry was one-fifth. The number of sore backs treated during this campaign was very large, being more than 500.

THE BOER WAR. 1899-1902.

Complete and accurate data concerning the losses of animals in the Transvaal is not available. Between October, 1899, and May 31, 1901, 143,130 horses and 79,514 mules were purchased in the United States, Argentina, Canada, Australia, Hungary and the British Islands. The purchase of horses and mules went on at an active rate in the United States, and a shipload of one thousand or more was embarked each week at New Orleans. It is believed well within the mark to say that 250,000 horses and mules were shipped to South Africa, and that the losses from horse diseases, peculiar to that country, together with the usual campaign losses, amounted to not less than 100,000 animals.

Besides suffering from the tsetse fly and the South African climate, the British cavalry was seriously weakened by being pushed to the front before the horses had recovered from the long sea voyage. There was no hay and little or no grazing much of the time. The grain fed without hay over-stimulated the horses. The American cavalry of the army of the Potomac was nearly ruined in this way during the winter of 1864, while in the cantonment at Brandy Station, the ration of grain having been increased to make up the deficiency of hay.

In these brief references to the experience of several nations, enough has been shown to emphasize the fact that heavy losses

of horses should be expected in service, and are absolutely inseparable from *active* and *successful* campaigning. This is said advisedly, for it would be courting disaster to teach any such doctrine as that the saving of horses from injury and death is of such importance as to permit it for a moment to hazard the full success of any campaign.

It took two years of a great war in America to bring about the establishment of the Cavalry Bureau; the result of this action was most beneficial to the armies in the field. The Cavalry Bureau not only enforced a better system of inspection, but by the establishment of several large and well equipped depots, under competent officers, it was enabled to receive a great number of broken-down horses for recuperation, about fifty per cent of which were ultimately returned to duty. Many of the others were sufficiently recuperated to be sold to farmers, thus repairing some of the waste of war and, at the same time, releasing fresh horses for army use. Thousands of horses were returned to the ranks after a few months rest which would otherwise have been abandoned, or if retained in the regiments would have seriously impaired the efficiency of the cavalry.

For many years before and after the Civil War the cavalry traveled incessantly to and fro over the mountains, plains and deserts of the great Western frontier, with varying degrees of fortune. Much of this occurred prior to the settlement of the country, and hence many of the long and arduous marches were accomplished with difficulty, often accompanied with actual suffering and disaster.

As early as the Mexican War, a cavalry column marched from Fort Leavenworth, Kan., to San Diego, Cal., a distance of more than 2000 miles, passing through a hostile country, and fighting several severe actions, before arriving at its destination.

During the Sioux Indian campaign of 1876 a brigade under General CROOK lost about 600 horses, a great many being killed

for food, upon which the entire command subsisted for some days. During the same campaign the Seventh Cavalry, operating with another command, lost more than 300 horses killed in action and from other causes.

During the autumn of 1879, while in action against the Ute Indians, all the animals of Major THORNBURG'S command were killed, as well as those of a troop which made a forced march of eighty miles to aid beleaguered comrades.

During the war with Spain the majority of the regular cavalry regiments participated in the Santiago campaign, dismounted, there being no transports available for the horses except those of one squadron of four troops. When the surrender of Porto Rico and Cuba took place, five cavalry regiments filled to war strength were transported with their horses to various ports in those islands, without any unusual loss.

The long sea voyage to the Philippine Islands caused a reduction of the mounted contingent of the first expedition, to one squadron, which was later reinforced by the remaining squadrons of the regiment. When it became apparent that without cavalry to cooperate with the other branches, the war in the Philippines would be indefinitely prolonged, several regiments were ordered there direct and these were later reinforced by those which had been assigned to duty with the China Relief Expedition.

A considerable number of animals have been killed in the Philippines, in the effort to eradicate glanders and surra, but from the date of the landing of American troops in those islands, up to the present time, including all the active field service incident to the insurrection, the percentage of loss of animals has not been abnormal, all things considered.

Instances of endurance and forced marches might be indefinitely multiplied from the records, especially those of the recent operations in Mexico and along the border.

CHAPTER X.

AGE OF HORSES.

Period of Longevity or Extreme Age.—“Rising” and “Past” a Certain Age.—Age as Indicated by the Teeth.—Temporary Teeth.—Permanent Teeth.—The Marks or Cups.—Angle Which Incisors Make in Coming Together.—The Tusks.—Rasping Off the Corners of Incisors.—Bishoping

Figure 91. Belle Mosby.

The probability of a horse's reaching an advanced age does not depend so much upon race and breeding as upon his care and surroundings. Bad treatment, food insufficient in quantity and poor in quality, alike tend to shorten the duration of the horse's service. In this way one horse may be old and worn out at twelve or fourteen, while another may continue to render satisfactory service at from twenty to twenty-five years of age.

In 1894 there was a horse, about twenty-six years old, still in service, in the regiment to which the author belonged, that, in 1875, participated in a march from Kansas to Arizona, a distance of nearly fifteen hundred miles. There were several horses used in the Fort Leavenworth squadron during the year 1894 which were more than twenty years of age.

There are numerous instances to substantiate the statement that horses live to be thirty-five or forty years of age. It will be sufficient to cite the case of "Belle Mosby," whose photograph is shown in figure 91 and that of the celebrated army mule, "Mexique," which died about 1886.*

* The mare "Belle Mosby" was stolen by a negro boy from a Confederate camp near Newmarket Creek, Va., in March, 1865, and was brought across the creek to the camp of the Eighteenth Pennsylvania by means of a single twelve-inch plank walk thrown across the abutments of the recently burned bridge. She was purchased from the negro by Lieutenant YOUNG in exchange for an overcoat. She soon after became the property of JOSEPH R. PHILLIPS, Company "F," Eighteenth Pennsylvania Cavalry, her present owner, who used her in service for several months, and then sent her home to his farm. She has never weighed more than 950 pounds. Her teeth showed her to be five years old when brought into camp, which makes her age thirty-five when the photograph was taken in 1894.

A few years ago a petition was sent to the War Department by the officers stationed at Mount Vernon Barracks, Ala., stating that a white mule which had been in service at that post for forty-five years was about to be sold as unserviceable, and requesting authority to purchase him, to be kept at their own expense, because of his long and faithful service. The petition was endorsed by General SHERMAN as follows:

"I have seen that mule, and whether true or false, the soldiers believe it was left at Big Springs, where the Mount Vernon Barracks now are, at the time General JACKSON's army camped there—about 1819 or 1820. Tradition says it was once sorrel, but now it is white from age. The Quartermaster's Department will be chargeable with ingratitude if that mule is sold, or the maintenance of it thrown on the charitable officers of the post. I advise it to be kept in the department, fed and maintained

It is usually claimed that mares live longer than horses, and small horses longer than large ones, but it is difficult to prove such statements because all animals do not receive the same treatment. Some animals lead a quiet existence with good hygienic surroundings, and attain great age, whereas, had they been used in a city on stone pavements, or subjected to hard campaigning with its consequent exposure and semi-starvation, they would probably have fallen victims before attaining even moderate age.

It is very generally accepted as a fact that horses which mature slowly live longer than those which mature rapidly, provided, of course, they receive like treatment and are not put to hard service until fully grown.

The difference in general appearance between young and old horses is very marked. It requires but little familiarity with horses to detect the extremes of age and the contrary condition. After maturity, however, more reliance is to be placed upon the indications afforded by the teeth, than upon outward signs.

In the majority of cases the incisor teeth or "nippers" may be examined by simply inserting the fingers in the side of the horse's mouth, and pressing the lips in front apart with the thumbs. The examination should always be made as gently as possible. If resistance is encountered the left hand should be placed upon the horse's nose quietly, while the right is introduced into the mouth to get hold of the tongue, which is gently drawn out on the left side. If necessary, the lower lip may be held with the left hand

until death. I think the mule was at Fort Morgan, Mobile Point, when I was there in 1842."

The Secretary of War thereupon made the following order: "Let this mule be kept and well cared for as long as he lives."

Secretary LINCOLN's order did not arrive until after the sale, but "Mexique" was bought in and kept by the officers until he died, about two years later. There was no documentary evidence, but the history of this animal was traced far enough to make him quite forty years of age, while less reliable information made him much older.

(figure 92). If the horse still resists, a fore foot may be held up, and in rare cases, a twitch applied.

Before examining the teeth in detail, the lips should be parted, and the angle at which the upper and lower incisors come to-



Figure 92. Method of examining the mouth when a horse resists.

gether observed. This angle is obtuse in young, and acute in old horses.

A horse is said to be *coming* or *rising* a certain age when his mouth is at the point of presenting the characters of the age to which reference is made; he has the age when all the characters

exist; he is *past*, when the characters begin to disappear; thus rising four; four; a four year old past.

Age as Indicated by the Teeth.—Structural alterations take place in the teeth every year up to the sixth; hence there can rarely be any question as to the real age of a horse up to that time, as indicated by the teeth.

After the horse has obtained his full set of teeth the age can be approximately determined by the effect of wear in altering their shape, by the receding of the gums, and by other signs.

Many circumstances, however, often contribute to modify the effect of wear on the teeth, and also to increase or decrease the action of time in other respects; hence a correct estimate of age can only be formed by those who have given to the subject considerable study.

The young foal usually has two, and sometimes three, temporary molars in each jaw. When about twelve months old another molar, a permanent tooth appears, and before completion of the second year a fifth molar, also a permanent tooth, shows itself.

At about two-and-a-half years of age the two anterior temporary molars are replaced by permanent teeth, and at between three and four the remaining or third temporary molar is replaced. At about the same time the last or sixth permanent molar begins to appear. Thus when the mouth is completed there are twelve permanent molars in each jaw, or twenty-four in all.

These structural changes afford a good index of the age of the horse up to the period when they are completed, namely, four years. These molars, however, are seldom referred to, because their position at the back of the mouth renders their examination inconvenient, and often very difficult. Nevertheless, it is well to be acquainted with the changes in the molars, in case there should be any doubt as to the true age as indicated by the incisors, up to and including four years.

A supplementary molar, known as "wolf's tooth," sometimes appears in either jaw. Such teeth seldom cause any inconvenience. If they should do so, they can easily be removed by the pincers, as they are only of a rudimentary character.

The incisors are six in number in each jaw when the mouth is complete, and in the immediate rear of these, on each side, but at a variable distance from them appears a pointed tooth, called tusk. These tusks begin to appear at about four years, but are not fully developed until the last permanent incisor is more or less up. Tusks are rarely found in mares.

Temporary incisors, called milk teeth, are easily distinguished from permanent incisors, being smaller, whiter, and having more distinct necks. They are smooth externally, and grooved inside. Their fangs are small, and have but little attachment to the gums. The jaws are plump, fleshy, and round, and the teeth are arranged in something like a semi-circle.

Permanent teeth on the other hand are larger, broader, wider in their necks, grooved externally, and smooth internally, and more discolored than milk teeth. The discoloration is due to the lodgment of the juices and other matters connected with the food in the grooves. The plumpness and circularity of the part of the jaw containing the incisors, is less than in the younger animal, and it gradually decreases, until in old age the teeth are arranged in nearly a straight line.

Temporary or milk teeth (incisors) are in the gums in a rudimentary state when the foal is born, and they appear from time to time during the first year, at the end of which period the yearling mouth is complete in all six incisors. The teeth are very close together, and show no signs of wear. The corner teeth are mere shells (1, 2, 3, figure 93).

At two years of age the inner wall of the corner teeth has grown up level with the outer wall. The center teeth show considerable signs of wear, and all the teeth appear somewhat smaller

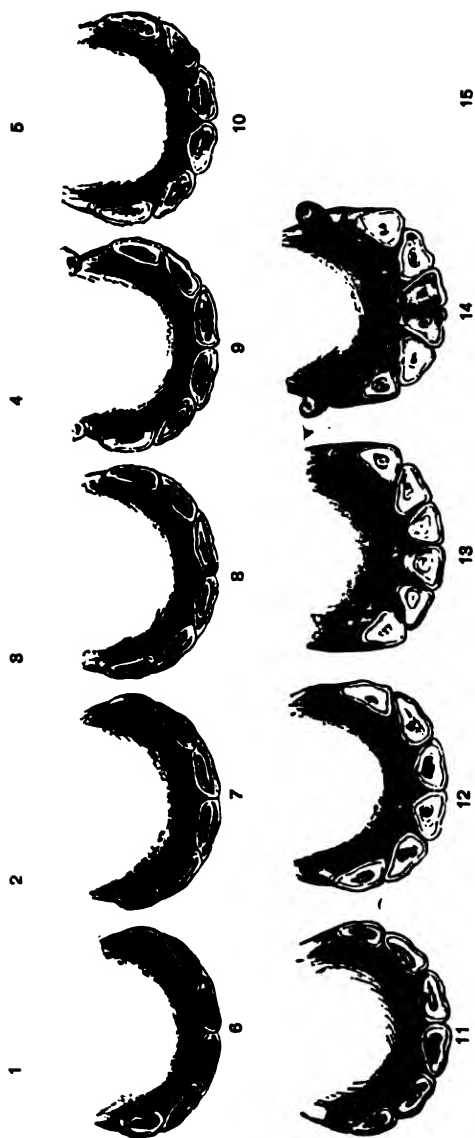


Figure 93. The temporary and permanent incisors.

than they did in the yearling. They also appear somewhat wider apart at their necks on account of the gradual growth of the jaw in width.

A few months before three years old the horse sheds the two center milk teeth which are replaced by permanent incisors.

Figure 94. Four years.

Thus at three years the jaw contains two center permanent and two milk teeth on each side (4, figure 93).

A few months before four, the next two milk teeth are shed and replaced by permanent teeth, the jaw now containing four permanent and two milk teeth (5, figure 93, and figure 94).

The tusks appear in that part of the lower jaw, on each side, between the incisors and molars, at about four, and continue to grow until the horse is five years old or past. The new tusk is quite sharp at the point when it first appears, and at five there

Figure 95. Five years.

is a slight bend inward, forming a hook at the top. This gradually wears off, and each succeeding year the tusk becomes rounder and more blunt, and its upper portion wears off.

Although the opposing tusks do not meet, they undergo changes from the effect of mastication, and thus become addi-

tional aids in determining age. In general terms, the young horse may be known by the sharp-pointed tusk, and the old horse by the flat-top tusk, which in the latter case is usually much discolored.

A few months before five the horse sheds the two remaining milk teeth which are replaced by permanent ones. The jaw now has a full set of six permanent incisors, but the corner teeth have no inner walls. This absence of internal wall distinguishes the five from the six-year-old mouth (6, figure 93, and figure 95).

A few months before six the inner wall of the corner teeth has grown up level with the outer wall, but in some cases this inner wall is entirely absent (7, figure 93).

The mouth is now complete in incisors, and no further structural changes take place in them. As a general rule the upper temporary teeth fall out a little before those in the lower jaw. Up to six years, owing to structural changes there can seldom be any doubt as to the age of the animal.

High feeding encourages the growth of the teeth in common with the rest of the frame, and may give a colt a very forward appearance for his age.

The Mark.—The mark or cup, as more commonly called, is a peculiar hollow extending, when the teeth first come up, about half an inch down in the temporary, and rather deeper down in the permanent incisors (figure 96).

When an incisor first comes up the hollow affords lodgment for the debris of the food and the juices expressed from it, and therefore soon looks black. As the tooth wears down the hollow of course disappears. The dentine immediately below the original hollow being of a somewhat soft material, has become stained for some distance down; thus there is still a black mark. With the further wear of the tooth the stained portion wears away, and the mark disappears. The time required for the mark to wear out varies according to circumstances.

Between three and five years the marks or cups are very plain in all the permanent incisors.

At six the marks are wearing out of the two center teeth, which come up at three years. They are plain in the two adjacent, and fresh in the two corner teeth (7, figure 93).

At seven the marks have disappeared from the center teeth, are wearing out of the two adjacent, and are distinct and plain only in the corner teeth (8, figure 93).

At eight the marks have disappeared from all but the corner teeth in which they are becoming indistinct (9, figure 93).

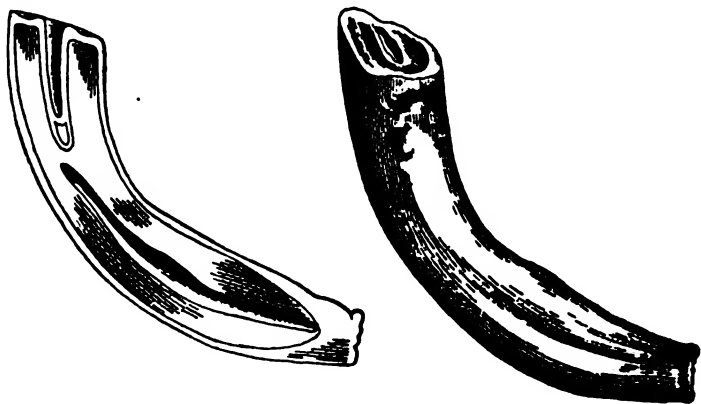


Figure 96. Incisor tooth and section showing mark or cup.

At nine the marks are not usually to be seen in any of the teeth (10, figure 93), but for about two years after the mark has disappeared in each tooth there may still be seen a trace of the enamel which lined the bottom of the original hollow, and which underlies it for some depth. This of course decreases in size with the wear of the teeth.

At about twelve or thirteen the last traces of the enamel have usually disappeared. The lower incisors all show a rounded section, and the dental star is quite central, and very apparent throughout (11, figure 93).

From the age of fourteen years (12, figure 93), to that of seventeen years (13, figure 93), the teeth assume a triangular form; the center ones, or pincers, at fourteen; the middle at fifteen, and the corners at from sixteen to seventeen.

At about eighteen (14, figure 93), the triangles formed by the teeth lengthen and become laterally contracted, so that at twenty or twenty-one years (15, figure 93), the teeth lose their triangular shape.

Many circumstances may cause a deviation in a slight degree from these rules. The time required for the mark to wear out will vary in different horses according to the hardness or softness of the teeth, and the nature of the food on which the animal is fed. Horses raised on the fresh, green pastures of well-cultivated farms retain their marks longer than range horses of the West which graze upon the dry and tough, but nutritious native grasses of the arid region.

Sometimes there are causes affecting the marks in particular cases to be taken into consideration. The most common of these are cribbing and "parrot mouth." In the first case the teeth are worn off rapidly by the constant gnawing of the animal, and in the second no wear of the incisors takes place because the upper teeth project over and in front of the lower, making it impossible for the horse to graze in pastures. Sometimes, but very rarely, the lower jaw projects beyond the upper jaw.

The upper incisors are larger and longer than the lower, and the hollow is nearly twice as deep. The marks or cups therefore remain visible a much longer time than in the lower teeth.

At seven years (figure 97) the lower corner incisors, being narrower than the upper, commence to wear the surface of the upper incisors into a well-defined angle, which becomes more marked at eight, and at nine appears as a deep notch. This notch is sometimes absent, but rarely so unless the corners have been rasped off with intent to deceive. This notch is particularly useful to those unable to decide upon the appearance of the tables or top surfaces of the lower incisors.

At eight years the dental star appears in the form of a yellowish, transverse line, most marked in the two center incisors, and indistinct in the others. From this time on the dental star must be considered, for after the ninth year the determination of age by the teeth becomes very difficult. After the twelfth year the age can be only approximately determined. After the six-

Figure 97. Seven years.

teenth year all is confusion, for there are no positive means of ascertaining the age from the appearance of the teeth with even approximate accuracy. It is safe then only by careful examination of the shape of the teeth, condition of the gums, appearance of the head of the frame, to announce that the animal is old or very old; to say *about* sixteen, eighteen, twenty, or twenty-five, indicates better judgment than to look at the mouth of an old horse and say he is "rising seventeen" or "nineteen past."

The dental star, mentioned as long at eight, gradually changes its appearance, until at fifteen it appears distinct and round in all

the lower incisors, and is found near the center of the tables or tops of the teeth.

When a horse has passed twelve, especially if weakened by hard service and poor food, his tongue begins to project over the bars.

In general the tables of a young horse's teeth are broad in the

Figure 98. Nineteen years.

direction of the jaw ; those of an old horse are round or broad in a direction perpendicular to the jaw.

The teeth of a young horse come together in front at a very obtuse angle, or almost in a line (figures 94 and 95). Those of an old horse, on the contrary, come together at such a small angle that sometimes the lower teeth seem to be in the prolongation of the jaw (figure 98).



Figure 99. Cross-sections, three right lower incisors of a five-year-old horse.

The changes of form in the top surface of the incisors arise from wear, but this may be illustrated in another way. Figure 99 represents a series of cross-sections cut from the three right

lower incisors of a five-year-old horse. It will be seen upon examination that at the top the sections are long in the direction of the jaw, 1 and 2; oval in the next few sections, 3, 4, and 5; rounded forms in 6, 7, 8, and 9; triangular or long from front to rear in 10, 11, 12, 13, 14, 15, and 16. The first shapes characterize the young, and the last the very old horse.

There are several fraudulent ways of giving a horse's mouth a more youthful appearance than nature has provided for his years. These are generally confined to rasping off the corners of the notches in the upper incisors, and burning new marks or cups in the lower incisors—a process called "bishopsing."

Figure 100. Bishopsed teeth.

To detect such frauds it is necessary only to remember that the shape of the teeth in young and old horses is entirely different, and that when the natural mark exists it is surrounded by a border of enamel which is in relief above the dental table. On the contrary, when an artificial hole is made, not being surrounded with hard enamel, the edges are not in relief (figure 100).

The fraudulent operation is very troublesome, the chance of detection is great, and ordinary horses are not sufficiently valuable to justify the labor or the risk attendant upon the operation. The ages of valuable horses are matters of record, and cannot, therefore, be falsified.

CHAPTER XI.

THE HORSE'S FOOT.

Necessity for Care of Horse's Foot.—Knowledge of Structure.—Foot as Means of Support.—Coffin Bone; Tendons; Navicular Bone; Elastic Portions of Foot; Wall; Sole, Frog.—Growth of Hoof.—Preparing Foot for Shoe.—Practices to be Avoided.—Important Points About Shoe.—Best Kind for Cavalry Horses.—Clips.—Nails.—Putting on Shoe.—Shoeing to Remedy Defects.

From the earliest ages, the horse's foot has been recognized as the principal region to which care and attention should be directed, for when injured or diseased—no matter how perfect the other parts may be—the animal's services are diminished or altogether lost. There have been many ingenious devices for protecting the horse's hoof from the damaging effects of wear, but many of them have not yielded the beneficial results to be expected from scientific inventions. Maladies of the feet and limbs, due to a great extent to faulty shoeing, form a very large percentage of cases met with in veterinary practice.

It requires but little reflection to see that with the great weight of rider, saddle, arms and equipments, making a total of about one-fourth that of the average cavalry horse to be carried on the animal's own back, the preservation and protection of his feet become of paramount importance. The rapidity with which a valuable mount becomes disabled when a lost shoe is not promptly replaced is evidence of the necessity for care which does not need to be repeated to carry conviction to intelligent officers and men. Careless or improper shoeing, or neglect during marches and cantonments in muddy localities bring alike disastrous consequences.

Many men who profess to be farriers show an amount of stupidity, verging, at times, on criminality, by cutting and mutilating the horse's hoof as if it was not susceptible of injury. The preservation of the wall or crust, the sole, the bars and the frog, as nearly as possible in their natural state should be the guiding principle in shoeing.

A knowledge of the structure and functions of the parts of the foot should be acquired by those having the management of horses in order that the animals with whose care they are charged may not be crippled by improper shoeing.

Figure 101. The horse's foot.

- | | |
|-------------------------------------|--------------------------------|
| A. The wall or crust. | I. The flexor tendon. |
| B. The sole. | K. The coffin bone. |
| C. The frog. | L. Sensitive Laminae. |
| D. The sensitive sole. | LL. Insensitive Laminae. |
| E. The coronary band. | M. Inferior sesamoid ligament. |
| F. The sensitive frog. | N. The extensor tendon. |
| G. The small or lower pastern bone. | O. The navicular bone. |
| H. The great or upper pastern bone. | |

Within the case composed of the horny wall of the foot, the sole and frog, there is a delicate arrangement of bones and tendons which needs to be understood to prevent injury in shoeing. Figure 101 shows the structure along the plane passed vertically through

the center of the foot. This section gives the coffin bone an appearance of being very pointed at the toe, which is due to the bottom of the bone being concave at the center of the foot.

The foot, as a means of support, has for its basis the small pastern bone *G*, the navicular bone *O* and the coffin bone *K*. The coffin bone is more particularly the foundation of the foot, and the nucleus on which the hoof is moulded, and which it much resembles in shape. Into its highest point in front, the large extension tendon *N* of the foot is inserted, and in the middle of its lower face, or sole, is implanted the powerful tendon *I*, which bends or flexes the foot. These two tendons are the chief agents in progression. An elastic substance surrounds them and a portion of the coffin bone, and the whole is enveloped by a membrane that attaches the hoof in the closest possible manner to its outer surface. Into each of the wings or sides of the coffin bone (it is crescent shaped, the horns extending backward on each side) is fixed a large plate of cartilage that rises above the hoof, where it may be readily felt. This plate has important relations with its fellow on the opposite side, as well as with other elastic bodies, so disposed as to sustain the weight, prevent jar and insure lightness and springiness in the horse's movements.

The navicular bone *O* is a narrow piece, placed transversely between the wings of the coffin bone, behind, and is intended to throw the flexing tendon further from the center of motion and thus increase its power. The tendon plays over the posterior or lower face of the navicular bone and this, together with the relations established between it and the pedal bone through their connecting ligaments, and the bend the tendon makes in passing over it, causes this part of the foot to be one particularly liable to disease. Navicular disease is incurable, and the pain induces the horse suffering from it to ease the parts by "pointing a toe." As already remarked in chapter I, a horse seldom rests a fore foot unless there is some injury or disease present, and in the majority

of cases, as soon as it becomes a habit, it may be safely attributed to navicular disease.

The elastic portions of the foot comprise the large plates of cartilage already mentioned as attached to the sides of the coffin bone; the coronary ring or cushion at the top of the hoof wall which performs the function of secreting or forming the horny wall in a manner similar to that of the human finger-nail; and last, the triangular plantar cushion, usually called the "sensitive frog," to distinguish it from the horny frog which immediately covers it.

Besides the elastic apparatus of the foot, more immediately in connection with the coffin and navicular bones, there is a living membrane which envelops the parts, within the hoof, as a sock does the human foot, and endows it with a high degree of vitality and secretory power.

The wall of the hoof is the oblique crust which covers the front and sides of the foot from the coronet to the ground, and which is bent inward at the heels to form the "bars," which are merely prolongations of its extremities. The outer surface of a healthy hoof wall is generally smooth and shining. The dimensions of the wall vary, being deep and thick in front while diminishing in height and becoming thinner towards the quarters and heels.

The horny sole is a concave plate covering the lower face of the coffin bone. The sole is thickest around its outer border where it joins the hoof wall, and thinnest in the center, where it is concave. A peculiarity of the sole is its tendency to break off in flakes on the ground face when the fibers have attained a certain length. The hoof wall, on the contrary, continues to grow downwards and unless rasped off by contact with the ground or by the implements of the farrier, will assume abnormal proportions. The horn of the sole is less dense and resisting than the hoof wall, and is designed more to support weight than to sustain wear.

The sole is more or less concave from its junction with the wall, but in moderately soft ground the whole of its surface aids

in sustaining the weight of the animal, and even on moderately firm ground a portion of the sole shares in relieving the hoof wall from pressure.

The horny frog is an outer duplicate of the sensitive frog, and is situated within the bars, towards the back of the hoof. Its point extends forward to the center of the sole and its base or thickest

Figure 102 shows the bottom of a natural foot. The nomenclature, indicated by the letters, is as follows :

- | | |
|--------------|--------------------------------|
| A. The sole. | D. The angle of bars and wall. |
| B. The bars. | E. The wall. |
| C. The frog. | |

part fills up the space in rear left between the walls. The horny frog is an elastic cushion resembling the pads on the feet of animals having no hoofs. The frog, like the sole, exfoliates at certain stages of its growth. To properly perform its function the horny frog must be left unmutated and allowed to come in contact with the ground.

The frog, on both soft and hard ground, is an essential element in the weight-bearing surface, and has great utility in obviating concussion, supporting the tendons and, on slippery ground, in preventing falls. In reducing the gait sharply from a gallop, or in descending a steep hill, a horse instinctively and forcibly plants the posterior portions of the foot on the ground to bring the frog into play.

There is a narrow strip of horn which binds the sole and hoof wall together, slightly more elastic than either. It is through this strip that small pieces of gravel sometimes work their way to the sensitive parts of the foot causing much pain and lameness and not infrequently breaking out through the hoof wall.

The imprint of the front hoof should be nearly circular in outline. A good hoof should have a smooth, unbroken wall, and the angle of slope at the front should not be less than 50° . The sole should be slightly concave at the circumference and deeper at the center. The hoof wall ought to be thick at the toe, gradually thinning towards the heels, but at the junction of the bars a strong mass of horn should be found. The bars should be free from fracture, and the frog moderately developed, firm and solid, the cleft being shallow rather than deep, and showing no trace of pulpiness or discharge.

The hind foot should possess the same soundness of horn, though it differs in shape from the fore foot, being more oval in outline from the toe to the heels. The sole is also more concave, the frog smaller and the heels not so high. The horn is usually less hard and resisting than that of the fore feet. In both fore and hind feet the dark hoof is generally the most sound and appears more resisting and indestructible.

In its unshod state, the hoof is being continually worn away by contact with the ground, and is also being constantly regenerated with new growth. The wall, with the laminae on its inner face, is formed from the coronary cushion at the top of the foot; the sole

from the living membrane covering the lower face of the coffin bone; and the frog from the plantar cushion.

The growth of the horn takes place by the deposition of new material from the secreting surface. The incessant reproduction causes these fibers to be mechanically pushed downwards towards the ground. Once formed, the fibers are submitted to no other change than that of becoming denser, harder and less elastic as they recede from the inner and approach the outer surface.

The secreting membrane is endowed with equal activity in all parts, and the growth will be regular throughout the hoof unless abnormal conditions exist. Abnormal conditions may arise from injury or disease at the coronet or from defective shoeing, which disturbs the usual direction of the leg and its movements and modifies the growth of the horn.

Any irregularity in the distribution of the weight of the body on the foot has a prejudicial effect on the secreting apparatus of the organ and, as a result, on the form of the hoof. When the weight is evenly imposed on the foot, being uniformly compressed throughout its extent, it receives everywhere an equal quantity of the horn-producing material by the regular flow of blood through it.

In a well-formed leg and foot, the degrees of resistance of the different parts of the hoof are so well apportioned to the amount of wear to be sustained, that all are equally reduced by contact with the ground, and the whole is maintained in a perfect condition as regards growth and wear. The amount of growth varies considerably in different animals, according to the development of the secreting apparatus, and in this the operations of the farrier are not without influence. The horn grows more rapidly in warm, dry climates than in wet ones; in healthy, energetic animals, than in those which are soft and weakly; in young, than in old animals. Seasons and locality also have their influences, so that in nature, soft horn is opposed to soft ground and hard horn to hard ground.

On hard, dry ground the hoof grows dense, tenacious, somewhat small, with a concave sole and a little but firm frog. In marshy regions the hoof becomes large and spreading, the horn soft, the sole flat and the frog a spongy mass, unfitted to sustain pressure from hard soil.

Under ordinary conditions, where horses are stabled and worked, the hoof grows down from the coronet at the rate of about one-fourth of an inch per month, so that the entire wall of a medium-sized hoof is regenerated in a period varying from nine to twelve months. In the natural, unshod state, when the equilibrium between growth and wear is destroyed, and the latter takes place in a rapid and unusual manner, the animal is compelled to rest until the worn hoof has recovered its proper length and thickness, for acute pain results when the living parts are exposed. Under artificial conditions, when the horse is employed to carry and draw heavy loads on hard roads or pavements, shoeing becomes necessary. This at once stops the wear of the hoof wall, which, continuing to grow, soon becomes inconveniently long unless the shoe is removed and the superfluous growth removed by the farrier's tools.

When a shoe has been on the foot, particularly a fore foot, for some time, the hoof wall presents the appearance of having grown faster at the toe than near the heels. This is accounted for by the fact that the shoe is nailed fast at the toe but not at the heels, and every time the weight comes on the foot the heels are pressed down against the iron shoe and slowly worn away. This pressure is so great at times that the hoof wall indents or channels out the shoe towards the heels. This growth of the toe gradually draws the shoe forward, making it too short; so the general growth of the hoof makes the shoe too small in circumference.

In preparing the foot, the heels usually require but little alteration. No hard and fast rules can be laid down as to what angle must be given to the front wall of the hoof, but the trained eye

of a first-class farrier should enable him to see what angle is in conformity with the natural bearing and direction of the leg. It should be borne in mind always that the amount of the hoof wall to be removed is limited by the sole. If the lower margin of the wall is quite level with the unpared sole, it requires no further rasping. When the circumference of the hoof has been brought to a size and condition to receive the shoe the sharp edge should be rasped off slightly to prevent the wall from chipping.

The sole requires no cutting or rasping, since all excess of growth is thrown off in flakes in a natural and healthy manner. The process of exfoliation is not very rapid but any interference with it is productive of injury. The horny sole protects the foot from bruises; when it is pared away the animal becomes more tender-footed and the hoof gradually loses its natural shape, the sole becoming concave and drawing the walls of the quarters inward, producing contracted heels. It should be the rule in all farriery that the sole must not be interfered with under any pretence whatever, so long as the foot is in a healthy condition.

The same remarks which apply to cutting the sole apply with equal force to the frog. It seldom becomes necessary to remove projecting and useless flakes. Sometimes a small stone or gravel may become imbedded and require removal from the frog by means of a blunt instrument. Veterinarians are often compelled to order shoes removed to allow the frogs and soles of maltreated and diseased feet to return, as far as possible to a natural condition.

The common practices to be avoided—and which are strictly prohibited in military farriery—are paring the sole with the knife until it gives to the thumb; paring the frog; opening up the heels, which consists in making a deep cut into the angle of the wall at the heel where it becomes bent inwards to form the bar; and, finally, rasping off the rim of the wall to make it fit a shoe too small for the particular foot.

In considering the shoe, there are several important points which deserve attention. The metal attached to the ground surface of the hoof is at the end of a long lever and its weight must be lifted at every step; in a day's journey this becomes of considerable moment. If the shoe weighs only a pound and the horse's foot is raised from thirty to sixty times a minute, according to gait, it will be readily understood that the four feet will raise an enormous weight during each day's march. The shoe should, therefore, be as light as is consistent with the work to be done.

A light, thin shoe is preferable to a heavy, thick one, because its thinness allows the sole, frog and bars closer proximity to the ground. But these desirable qualities have limitations fixed by the character of work demanded. A saddle horse for pleasure riding may wear a very thin shoe; the cavalry horse must have one with enough iron or steel to stand at least thirty days' wear on rough roads; the large draught horse must have a shoe sufficiently heavy to admit of attaching heel and toe calks to enable him to fully exert his powerful efforts in moving heavy loads, particularly in backing. It is sometimes necessary to use ice nails or calks on cavalry horses and hence the regulation shoe must have metal enough to admit of this.

The upper or hoof-bearing surface of the shoe should not be bevelled, and need not be very wide if the sole has been left unpared. Bevelling the upper surface furnishes a lodgment for gravel and chips of stone, and as the bevelled part furnishes no support, it only gives additional weight to no purpose. The shoes now issued for cavalry horses have a very slight bevel on the upper surface (figure 103).

The ground face of the shoe should be parallel to the upper face in order that the foot and leg may maintain a natural position. If the quarters are thicker than the toe, the heels are unduly raised, and if the toe of the shoe is thicker than at the heel, an undue strain is put upon the tendons in rear.

In the natural foot the ground surface is concave, and applying this to the consideration of the shape of the shoe, it is found that if any metal is to be bevelled from the shoe it should be from the lower instead of the upper face, which comes in contact with the hoof.

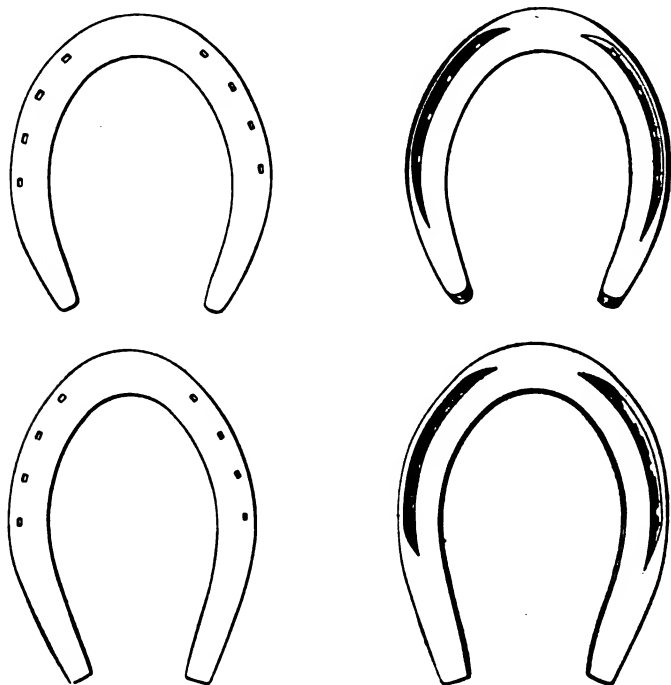


Figure 103. U. S. Cavalry horse shoes, fore and hind, fitted. Upper illustration represents top and bottom surfaces of fore shoe, and lower those of the hind shoe.

Clips, when properly placed, are of service in retaining the shoe and permitting the number of nails to be reduced. As a rule, clips are not necessary on shoes for cavalry horses, but in some cases toe clips are useful.

The shoe should be attached by nails to those parts of the wall where the horn is strongest and toughest, and the smallest number which will answer the purpose should be used. In the fore foot the horn becomes thin towards the quarters and the nails having less support than nearer the toe, there is greater danger of injuring the living organs within the horny wall. In the hind foot, the wall is generally stronger towards the quarters and heels. In the fore foot the nails may be driven a little nearer the heel on the outside than the inside quarter. In the hind foot they may be driven around the toe and entirely back to the heels, if necessary.

Nail holes are usually roughly stamped in the shoe in greater numbers than required, but only the number to be used in any case need be punched out. Heavy shoes of course require a considerable number of nails for a large foot, but in cavalry service, five nails, two inside and three out, will be found ample for nearly all horses. If the shoe is well fitted and the nails not bunched in one part, the shoe will usually remain in position until worn out. The smallest sized nails which can be made to answer in each case should be used.

With the limited forge facilities available in the field, the army must, necessarily, be supplied with machine-made shoes. Some of the shoes require fitting before they can be used, but some others are issued ready to be put on. Ordinarily it is preferable to fit shoes at the forge for each individual horse, for issue to troopers to be carried in the saddle-bags as spare shoes, and have an extra supply forged and with nail holes punched out for general use when opportunity is afforded to reshoe the animals all around.

Presuming that the horse has a natural and well-shaped foot, the first step in shoeing is to shorten and level the hoof wall. The shortening should be accomplished by removing the surplus growth of wall with the cutting pincers and then leveling the lower margin of the wall with the rasp, which should be applied in an

oblique manner, across the ends of the fibers. It should be remembered in leveling the sides of the hoof wall that the difference of a fraction of an inch between them will cause considerable oscillation of the weight thrown on the leg, especially at the fetlock.

When the surplus horn has been removed and the foot leveled to receive the shoe, one should be selected which follows the outlines of the hoof wall. If not already so, the shoe should be so moulded as to be an exact reproduction in outline of the circumference of the hoof.

The shoe should be wide enough at the toe, quarters and heels to support the entire thickness of the hoof wall, but not so wide as to endanger the opposite legs by striking them, nor so long at the heels as to make it possible for them to be torn off by the hind feet treading upon the fore.

Under no circumstances should a shoe too small in circumference for the foot be put on, for this involves rasping away the projecting hoof wall and taking away some of the natural support to the leg. Under no circumstances should the wall be rasped away after the shoe is put on. All farriers are inclined to do this to make a neat looking job, but the practice is forbidden so far as public animals are concerned.

It is hardly necessary to enter into the ancient controversy concerning the virtues of hot and cold fitting. Suffice it to say that it is a quicker and surer way of securing an accurate fitting of the upper surface of the shoe to the foot if it be done at the forge while the shoe is hot. Judgment must be used in this as in everything else, to the end that injury be not incurred by holding the hot shoe long in contact with the foot; it should be barely touched to the foot to determine if any further fitting is necessary. When hot fitting is used, the farrier is more apt to fit the shoe to the foot, instead of the foot to the shoe, for it is then easy to mould the hot shoe to the proper shape.

In putting on the shoe every nail should be driven in sound horn. No attempt should be made to utilize old nail holes. A low, thick hold of the wall is better than a high thin one, and, if possible, no more horn should be included in the grasp of the nail than is likely to be removed at the following shoeing. By this means the hoof wall is maintained solid and sound. Skillful driving of the nails is essential to good shoeing, for the nails are made of a fine quality of soft iron and frequently bend so as not to emerge at the proper point in the wall.

The nails at the front part or toe of the shoe should be hammered home firmly and then the quarter or heel nails driven. When all the nails have been driven in solidly, the points should be cut or twisted off and the nails tightly drawn up.

The fragment of the nail projecting through the horn should be shortened to proper length with the rasp so as to leave just enough to turn over. The small barb of horn raised in drawing up the nail should be removed with the rasp, without making a notch, and then the clench is laid down. No more rasping or cutting should be indulged in after this operation, as all attempts to smooth off and beautify the hoof wall are injurious in the extreme. The clip, or clips, when used, should be driven down by gradually decreasing blows, commencing at the bottom where the clip springs from the shoe.

When the time for reshoeing arrives, the old shoe should be gently removed by carefully cutting away the clenches. The pincers are then used to start the shoe from the foot so as to loosen the nails, which should then be carefully withdrawn, one by one. Particular care must be taken that no clenches or broken nails remain in the hoof.

If the hoof be preserved as nature intended it, a horse can be used with ordinary shoes, but if the foot be pared and rasped unnecessarily, the most ingeniously contrived shoe will not save the animal from unsoundness, discomfort and premature break-

down. Too much care cannot be devoted to the fore feet, because the largest proportion of the animal's weight is borne by the fore legs, and hence the greater danger of injury. It is not uncommon in garrison, where the ground is not stony, to leave off the hind shoes of cavalry horses, for the reason that the hind feet are quite exempt from the usual diseases and injuries which constantly threaten the fore feet.

Sometimes shoeing may be so done as to remedy the evils resulting from natural or acquired defects.

"Cutting," or striking and wounding the inner side of the leg with the opposite foot is sometimes a cause of serious annoyance. It may arise from weakness, fatigue, or from a change in weight of shoes or manner of shoeing. Sometimes it arises from malformed legs or faulty action. The usual part of the hoof with which the horse strikes the opposite leg is the inside toe or quarter. The usual correction is to straighten the shoe at the point where it strikes and rasp off the hoof slightly to diminish its convexity and thus avert "interfering." No nails should be driven near the point of danger.

Some horses have peculiar and awkward habits in lying down. Occasionally a horse folds his feet up so that the shoe presses against the spot where the cincha rests and causes painful sores from the bruises received every time the animal lies down. Some horses double up a fore leg so as to bring the hoof in contact with the elbow, producing "capped elbow." This frequently develops into an unsightly tumor. It is generally the inside heel which causes the evil, and this may be remedied by a three-quarter shoe. In any case, the shoe should not be allowed to project beyond the hoof.

So long as the hoof is treated in a rational manner, there should be no occasion for the common practices of oiling the hoof walls and "stopping" the feet with clay, tar and other compounds.

CHAPTER XII.

STABLE MANAGEMENT.

Herding.—Stables.—Ventilation.—Water.—Feeding.—Stable Routine.—Grooming.—Nursing Sick Horses: Discharges; Hand Rubbing; Sponging; Hot and Cold Applications; Steaming; Poultices; Bandages; Pulse; Temperature; Blankets; Removing Shoes; Balls; Drenches; Injections.

In American cavalry garrisons the horses are usually housed at night, and herded when not in use during the day, not only for grazing but also in order to keep up the habit of coming quietly to the picket line, which is so essential for field service. The stables generally are frame buildings at the northern, and open sheds at the extreme southern stations and in the Philippine Islands. A few of the new and more permanent stations are provided with brick or stone stables of modern design.

Doubtless the thorough ventilation of the frame stables and sheds is the cause of the general good health of the horses. Pure air in abundance is the one thing insisted upon for animals which may be called for at any moment to make a ride for life. To carry this idea out completely, open corrals or yards are usually attached to stables, and when not in use or on herd the horses are turned loose. There is none of that senseless hardening of horses, so-called, by exposing them unnecessarily to extremes of weather, nor on the other hand any hot-house coddling.

To accomplish good results constant personal supervision by officers is necessary; in no instance is the attention to duty or neglect of it so quickly reflected as in the condition of cavalry horses. In the field advantage must be taken of every circumstance which redounds to their benefit. Only those who have had experience in such matters can appreciate the difficulty encountered

in keeping up the condition of horses subjected to irregular hours, short rations, and carrying heavy weights.

In garrison the stable should be kept as even in temperature as possible by opening or closing doors and windows. During violent storms or "blizzards" in cold climates it may be necessary to close everything but the top ventilators to prevent suffering. As soon as the storm has ceased thorough ventilation should be provided. The best time to test the ventilation or purity of air is at morning stables when the doors are first opened. The stables are seldom closed in summer, the doors being replaced by bars.

While ample ventilation is very necessary, draughts should be avoided. Provision should be made to let in a gradual and constant supply of fresh air, and also for the egress of the foul air which rises. When the horses are out of the stable the windows and doors should be left open.

Ventilating shafts should be constructed in the roof, and the number of these should correspond with the size of the stable and number of animals assigned to it. In addition to these ventilators, the space between the wall plate and the roof is often left uncovered in mild climates. There should be openings of from twenty to thirty square inches, covered with grating, left at frequent intervals along the wall, a few inches from the floor. Shutters should be provided for these openings, so that they may be closed when necessary.

All ventilators should be arranged so that the stablemen can easily close them on either side, according to the state of the wind and weather; it should seldom be necessary to close them on both sides at the same time. When hollow walls are used the small openings, with gratings, may be arranged so that the one on the outside will be above the one on the inside, which will prevent all direct draughts.

Ventilation should never be dependent upon the opening and closing of windows, but they should all be arranged so that they

can be utilized when the ordinary means of ventilation prove insufficient.

Although not so important as ventilation, the lighting of the stable should receive careful attention. As far as possible the light supplied by windows should be admitted so as not to produce a glare directly in front of the horses. If the arrangements are such that it is necessary to have the horses face the windows the window frames should be put in lengthwise of the wall and up above the heads of the horses. At night one or more lamps are hung in each stable.

The watering of the horses requires careful supervision to insure that they are watered at the proper times and are never hurried while drinking. Horses should be watered three times a day in warm weather. When turned loose, free access to water should be had at all times. In winter twice a day is as often as a horse will drink, as a rule. The first watering should be several hours after sunrise and the last just before being tied in for the night. The proper time to water a horse is *before* and not immediately after feeding.

In civil communities horses are usually fed three times a day, but in the army feeding in the morning and evening is the general rule. Hay and grain are fed in the evening and grain in the morning. When the animals are not in use the regular ration is supplemented by as much grazing as season and locality permit. When bran is fed it is given as a mash and not mixed with the whole grain.

The stomach of the horse is comparatively small, and should not be distended by large feeds at long intervals; however, twice a day is all that it is practicable to feed in campaign.

The inclination to eat depends upon climate, work, and the nature and quality of the horse's food. In many cases of sickness, health is restored by a change of diet, but as a sign of health, the horse's appetite is not to be entirely relied upon. When horses

are sick they should receive their food in small quantities, and if not completely eaten, what remains should be removed before the next feed is given.

After the horses have finished their morning feed of grain they should be tied on the picket line, where they are to be groomed. The stablemen go to work at once, removing the manure and shaking up the bedding. Such of the bedding as is too much soiled for further use is put with the manure; the balance is forked over and lightly piled in the front end of the stalls. This gives the floors a chance to dry out, for cavalry stables on the frontier are seldom provided with drains; in any event the stall will be more or less damp from the urination of the horse over night.*

As soon as the stalls have all been cleaned out the manure is loaded on the troop wagon and hauled to the place designated as the dumping ground. It is a very common fault of stablemen to overload the wagon and distribute manure along the avenues and roads leading to the dumping grounds. This should be prevented by the use of extra side boards.

The hay is next hauled and distributed in the stable at places convenient for putting it in the mangers. Later the straw is distributed, and the stablemen, beginning at one end and working on both sides, proceed to arrange the bedding.

The morning feed of grain is usually put in the feed boxes at the first call for reveille, the feed cart being taken down the center of the stable while the stable orderlies dip out the grain in ration boxes made to hold one feed. The grain for the evening feed is put in the boxes at afternoon stables.

The officer attending stables inspects the hay, grain and bedding of the horses. If the forage is musty, dirty, or otherwise

* While investigating the remount systems of England and France, the author observed that in British cavalry stables the common practice is to remove the bedding entirely instead of piling it under the mangers, and in French cavalry stables the bedding remains spread down in the stalls all the time.

unfit for the animals, he takes the proper steps for obtaining a fresh supply without unnecessary delay. Should the bedding be too much soiled he directs its removal, and causes fresh straw or hay to be littered down. Stalls with earth floors should be inspected frequently to see that they are kept level, and that holes pawed out are refilled.

Above all other considerations next to pure air, dryness should be insisted upon about the stables. Horses prefer warmth and dryness, and putting them in damp stables is apt to cause debility and disease.

Grooming is essential to the general health and condition of the domesticated horse, and is not altogether for appearances. With hard work and high feeding the excretion of worn-out materials through the skin is very great; hence artificial means are necessary to remove the refuse.

Grooming removes from the skin those particles of perspiration, dust and dirt which would otherwise impede and clog the free action of the sweat and oil glands. It also removes the scurf or worn-out cells which are no longer required on the surface of the skin, and which would, when cemented together by particles of sweat, add to the obstruction of the glands. The grooming should take place outside of the stable when the weather permits, to avoid filling the mangers with dust.

The thorough cleaning of the skin of the horse is an operation requiring both skill and hard labor. To produce the greatest effect with the least expenditure of power and in the shortest time, the trooper should aid his muscular strength with his weight. He should stand well away from the horse and lean his weight on the brush, which will thus do its work more effectually than if operated by muscular strength alone. The working of the brush should follow the natural direction of the hair. The currycomb should be used as little as possible, and principally to loosen accumulations of mud.

When a horse is worked, and grooming is neglected, he soon loses flesh and deteriorates in health; actual disease of the skin may follow, for the presence of parasitical insects is induced by filth, and when not disturbed by grooming they breed rapidly.

Horses should not be washed, even on the legs, except to remove caked mud; they should be at once dried and groomed thoroughly. Horses should, under no circumstances, be allowed to dry by evaporation. Sponging the nostrils and dock is very refreshing to the animal.

The sheath should be frequently cleaned when the weather permits. Some horses require this much oftener than others. Care is necessary to prevent injury by the finger-nails, a slight scratch often producing much swelling. The washing should be done with warm water and castile soap. It is a common practice to follow washing by smearing the parts with olive oil. This should not be done, as it causes filth to accumulate rapidly, thus doing more harm than good.

Each morning as soon as the horses are tied on the picket line the horseshoer should select those which require shoeing, and separate them from the others.

At many posts where the ground is free from stones horses are not shod continuously, but a proportion are left without shoes in order to let their feet spread out and assume a natural shape. This practice saves many horses from suffering with contracted feet. Shoes are kept fitted for each horse at all times, for thorough tests made on service show conclusively that horses cannot stand hard field service with unshod hoofs.

In cold climates ice nails are kept on hand, or shoes are fitted with calks for such horses as are likely to go on service after horses are shod for winter with sharp calks it is dangerous to turn them loose, and even at the picket line they must be watched constantly to prevent serious injuries from kicking.

Notwithstanding the care with which horses are inspected before purchase, many with stable vices are passed into the service and it requires patience and watchfulness to cure or minimize the effects of their tricks. The more common vices are pulling back when tied; kicking; refusing to leave the stable and sometimes scraping a rider against a wall or fence.

A horse may sometimes be cured of pulling back and breaking halters by putting a rope, with a running noose, around his body. the loose end being carried forward between the forelegs and tied to the manger. When the horse settles back and the rope tightens, he is very apt to stop and move forward again. If this does not effect a cure, take a piece of new hemp rope and put it under the animal's tail as a crupper; put a knot in to hold the rope up on his back and pass the ends forward on each side of the neck, through the halter ring and tie to the manger. One or two applications are usually sufficient.

A horse sometimes kicks the sides of his stall apparently for amusement. Some horses kick at others and even at the stablemen passing in rear. Usually a kicker is dangerous only to the unsuspecting trooper who puts his hand familiarly on the animal's hind quarters before speaking to him. An application of the rope is quite often effective in such cases. A piece of small rope is put on each hind foot, with a slip knot, and tied to the halter ring or even to the rings of a snaffle bit in the horse's mouth. He should then be given some inducement to kick and when he finds it results to his own injury, he is very apt to give it up; when he does so, much care should be taken not to cause him to resume the habit.

Horses that crib or gnaw the wood work may be temporarily deterred by smearing some disagreeable substance over the exposed parts, but animals cling to this vice and will resume it at the first opportunity. The safest plan is to cover the wood work within reach with tin. The practice of driving nails and tacks in exposed wood work only results in injuring the horse's teeth and lips.

If a horse refuses to leave the stable with a rider, he should be led away and taken for a ride of several hours. After he has been ridden until he is no longer fresh, the rider should dismount and work him at the bending lessons; pick up his feet; mount and dismount frequently and let the animal see that he has nothing to fear. Avoid the use of the spur and whip on such an animal in the early stages of his training and be sure when the time comes to use the spurs, that they be applied by pressure and not by pounding his sides with the heels. This evil trait should be overcome as soon as discovered, for should a remount be passed into a squad for training while still affected with this habit, he may be readily ruined and help to spoil other horses.

If a horse in refusing to leave the stable, endeavors to rub against a wall or fence, the rider should not endeavor to turn him away but pull his head into the obstacle and he will get away from it himself.

Such vices as have just been mentioned should be discovered by experienced stablemen soon after remounts arrive and corrected as far as possible before the animals enter the training squads.

Every trooper should receive individual instruction concerning the proper treatment and care of horses generally, and should be informed as to the following rules prescribed on the subject:

“Never threaten, strike, or otherwise abuse a horse.

Before entering a stall, speak to the horse gently and then go in quietly.

Never take a rapid gait until the horse has been warmed up by gentle exercise.

Never put up a horse in a heated condition; throw a blanket over him and rub his legs, or walk him until cool. When he is wet, put him under shelter, and wisp him until dry.

Never feed grain to a horse nor allow him to stand uncovered when heated. Hay will not hurt a horse, no matter how warm he may be.

Never water a horse when heated unless the exercise or march is to be immediately resumed.

Never throw water over any part of a horse when heated.

Never allow a horse's back to be cooled suddenly, by washing or even removing the blanket unnecessarily.

To cool the back gradually, the blanket may be removed and replaced with the dry side next to the horse."

As a rule the attachment which exists between the troopers and favorite horses will insure the latter good treatment, but there are always a few rough, vicious or stubborn animals whose condemnation or death would not cast any gloom over the command; these latter will require the attention of officers to prevent their being neglected.

All officers cannot be expected to become accomplished veterinarians, but each one should familiarize himself with such injuries and diseases as occur with frequency in cavalry commands, and acquire a knowledge of such simple remedies as may properly be administered by the stablemen in the absence of a veterinary surgeon. The commander of an organization, the horses of which are unthrifty or unserviceable from preventable causes, is properly subject to severe criticism.

It should at all times be kept in mind that prevention of disease is more creditable than a successful cure, and that when disease or injury does come, good nursing will in most cases avail as much, if not more, than medicine.

There are many minor ailments to which cavalry horses are subject which may be treated in the stalls or at the picket line, but for an animal whose sickness affects the nerves or lungs, rest and quiet are essential. To this end, if in garrison, one or more box stalls, about twelve feet square, should be provided for each troop; this will remove the sick horses from the excitement which is bound to exist about a large stable, and give them room to turn around and assume whatever positions may seem restful. The

box stalls should be separated from the main building, if practicable; if not, they may be partitioned off in the stable, so that they may be darkened if necessary. The walls should be white-washed and the floor covered with clean straw.

Fresh water should be provided in a bucket, for a feverish horse will frequently help himself if left alone. In this way some medicines can be administered, but the sense of smell is so acute in horses that they may refuse water if there is any strong odor of medicine attaching to it.

The appetite of a sick horse is often very capricious, and during fever he may refuse food altogether. Place before him, in small quantities at a time, as great a variety of food fit for his consumption as can be obtained. Uneaten food should be removed before it becomes sour.

When not prevented by swollen head or neck, a horse discharging at the nostrils should, as a rule, be fed from a bucket placed near the ground, as the depending position of the head will be more comfortable to an animal in such a condition. The bucket should be used for no other purpose, and should be cleaned carefully after use. All woodwork should be particularly cleaned where any particles of a suspicious discharge have been thrown or lodged.

Hand rubbing of the legs is very useful in restoring circulation, as well as for the purpose of removing any swelling arising from want of exercise.

Hot fomentations in cases of sprains, and to allay inflammation, are very beneficial. To obtain good results they must be continued for a long time, say for two hours. The water should not be too hot; it should be at such a temperature that the hand can bear it comfortably. Allow the water to trickle over the inflamed parts. Flannel or woolen bandages may be wrapped around the parts, and kept wet with warm water; they will retain the heat for some time. Fomentations should be repeated three times within twenty-four

hours, and between these operations the parts should be warmly covered to keep out the cold. Cold applications harden and brace up the parts to which they are applied; they also reduce heat. They are very useful in cases of bruises, swellings and sprains, particularly after the inflammation has been reduced by hot fomentations. In some cases a rubber tube arranged to allow cold water to trickle over a specific part or surface is of great assistance in hastening recovery. Cold water bandages are the most common applications, owing to the difficulty of getting stablemen to properly apply hot fomentations. An anodyne liniment should be used when necessary in addition to the water treatment.

Steaming is very efficacious in cases of common cold and other diseases of a catarrhal nature. Steaming may be quickly accomplished by holding the animal's head over a pail of hot water, which should be stirred gently with a whisp of hay. The steaming may be done by placing chopped hay or saw dust in the bottom of a nose bag or grain sack and pouring in a little very hot water. Both these methods are useful expedients for the reason that they are always available in every stable and also afford a means of getting chloroform, carbolic acid or other medicines into the nasal passages by inhalation.

A simple machine, which affords the surest means of thoroughly steaming animals suffering from catarrhal affections, consists of a cylinder of sheet or galvanized iron, arranged to hold a hot water kettle made with two detachable spouts which project through openings in the sides or top of the enclosing cylinder. The kettle is held in place by cross bars, and an alcohol lamp below supplies the heat. The steam is conveyed from each spout, by means of a rubber tube, to a canvas nose bag made without a bottom, and attached to the head of the horse in the same manner as a feed nose bag. A tin funnel is arranged to fit each rubber tube to prevent the end of the tube from being poked into the animal's nostrils. When only one spout is used the other should be closed.

By using both tubes it is practicable to steam two animals at the same time. To do this the apparatus should be placed at the heel post and the two animals to be steamed backed into the adjoining stalls. One attendant is necessary for each animal. Some animals are very nervous about their heads but as soon as a sick horse begins to get relief from difficult breathing he is apt to stand perfectly quiet while being steamed.

Poultices are often of great service, but they are difficult to apply. They should be inclosed in some strong but thin material in order to prevent the substances from which they are made becoming entangled with hair. They should not be left on long enough to dry, as they then irritate affected parts.

Bandages of cotton or wool are useful for holding poultices in position, closing wounds, compressing specific parts, and for giving warmth to the legs. Roller bandages are used on the legs, but the size and shape of others depend on their use. Usually roller bandages are simply wound around the leg and pinned or tied at the top and bottom. If pressure is desired the bandage may be applied as shown in the accompanying illustration. It is at times not an easy matter to keep a bandage in position by ordinary means. The difficulty may be overcome by preparing some form of harness to which bandage strings may be attached, varying it according to the part of the body or limbs to be covered (figure 104).

The pulse of a horse is an important guide in determining his state of health. It indicates the number, force and regularity, or irregularity, of the heart's action, and the quantity of blood sent forth at each beat. As a rule, the number of pulsations corresponds with the heart's contractions. The pulse of a healthy horse varies from thirty-four to thirty-eight. It is generally quicker in young horses than aged ones, and also quicker in well-bred than in heavy, cold-blooded animals.

The most convenient places for taking the pulse are the arteries under the jaw and inside the fore leg above the fetlock joint. It

may be taken by placing the ear at the left side of the chest. The slightest excitement when a horse is sick will cause an alteration in the pulse. The animal should therefore be approached very quietly and soothed for a minute or two before applying the finger to the artery. The fore and middle finger should be placed on the artery in a transverse direction, and not obliquely.

Figure 104. Some methods of applying poultices and bandages.

A strong and full pulse characterizes health, and is seldom found when the animal is in any morbid state.

A weak and small pulse is indicative of great debility, especially if the pulse is easily extinguished by pressure.

A very slow pulse indicates probable disease or injury of the brain or spinal cord.

The number of pulsations per minute under different circumstances in disease varies from twenty to one hundred, or even more.

Temperature in the case of a horse is ascertained by use of a small clinical thermometer, which is inserted in the rectum and allowed to remain about five minutes. The ordinary temperature in good health is about 99°F. It should be taken without exciting the horse by removing blankets or moving him about. In continued illness, where the temperature is an important consideration, it should be taken at the same hours every day.

During the prevalence of influenza or other epizootic disease in stables, it is advisable to take the temperature of all horses daily: a rise of a few degrees, which indicates the approaching disease, is sufficient to order the animal to be withdrawn from work, for this prompt action will often cause the disease to run a milder course. Work in the incipient stages of these diseases often causes them to assume a fatal form.

When the condition of the horse requires artificial covering the blankets should be fastened on loosely. They should be removed, shaken, and aired during the day, the horse being covered with others temporarily if necessary.

In cases of serious or prolonged sickness the shoes should be removed from the horse.

Artificial inflammation is often resorted to as a stimulant to parts deficient in vitality, or for the relief of inflammation in internal organs. This artificial inflammation is often needed to rouse to new and healthier action parts which have become, through disease, deficient in vital energy. The healing process in many ulcerative diseases is very sluggish and languid, and the effect of induced inflammation is often to rouse not only the part affected, but all the neighboring structures to new and healthy action. This treatment may vary from the light, stimulating friction produced by hand rubbing the parts or a mild mustard plaster, to a strong cantharides blister or a seton.

Before applying a blister the hair should be clipped from the surface where the medicine is to be applied. After the blistering ointment has been well rubbed in, the animal's head should be tied so that he cannot reach the blistered surface with his mouth. After twenty-four hours or more the blistered surface should be washed with warm water and soap, and the parts thereafter kept clean. Sometimes when the sprain is severe and the pain great, it may hasten recovery to remove the weight from the injured member by means of a sling.

By seton is meant the introduction, by means of a seton needle, of a tape or string, intended to act on the deep-seated tissues and induce suppuration. The management of a seton requires a good deal of attention. It must be pulled up and down in the wound every day, the pus carefully pressed out, and the orifices washed with warm water. The two ends of the tape or string may be tied together, or small pieces of wood attached to the ends, to prevent them from being accidentally drawn into the wound. The tape should be renewed about once a week, if intended to be kept in for some time.

Firing is the most rapid way of producing inflammation. Much of the firing done, however, is of no value, and it nearly always leaves a blemish. It should be done only under supervision of the veterinarian, since much irreparable injury may be done by useless or improper firing.

Medicine may be administered to the horse through the following channels: by the mouth: by inhalation into the lungs and air passages; by the skin through absorption; under the skin by hypodermic methods, and by injections into the rectum.

Medicine may be given by the mouth in the forms of powders, balls or capsules, drenches and electuaries.

Powders should be as finely pulverized as possible in order to secure rapid solution and absorption. They should be free from any irritating or caustic action on the mouth. If dry, the powders

may shake down to the bottom of the manger; the practice is, therefore, to dissolve or suspend them in water and sprinkle on the feed. Those without disagreeable taste or odor are readily taken in the feed or drinking water.

Balls should be cylindrical in shape, about two inches long and half or three-quarters of an inch in diameter. They should be fresh, and wrapped in tissue paper when given; gelatine capsules may also be used. Balls are preferred to drenches when the medicine is disagreeable; when the dose is not large, and when the medicine is intended to act slowly. Balls may be made up by the addition of honey, syrup or soap.

When medicine is given as a drench enough water or oil must be used to thoroughly dissolve or dilute it. Insoluble medicines may be given suspended in water, the bottle being shaken before administering it. If a drenching horn is not available, use a long-necked bottle without a shoulder, of suitable size to contain the dose. The head should be elevated enough to prevent the horse from throwing the liquid out of his mouth. The halter strap should be passed over a limb or beam, but if none is available a pitchfork or pronged stick inserted in the halter will answer to raise the head until the line of the face is horizontal, which is all that is needed in any case. The horn or bottle should be introduced at the side of the mouth and slowly emptied. If the horse does not swallow, remove the bottle and rub the throat gently. If coughing or any accident occurs, lower the head immediately. In no case should drenches be given through the nostrils.

Electuaries are medicines mixed with licorice root powder, molasses or syrup, to such a consistency that the mass will stick to the tongue and teeth. They are given with a wooden paddle or long-handled spoon.

Medicines may be administered to the lungs and upper air passages by insufflation, which consists in blowing an impalpable powder directly into the nostrils, and by inhalation in the case

of gaseous or volatile medicines. The first-named method is rarely resorted to. It is a common and well-recommended practice to make use of the steaming bag when administering iodine, carbolic acid or other prescribed medicine to the air passages.

Medicines are only applied to the skin of a horse for absorption in local diseases, usually as liniments or blisters.

Medicine is frequently given under the skin with the hypodermic syringe. It should be done only by the veterinarian.

Injections are usually thrown into the rectum with a large syringe; but a straight tube about twelve inches long, of a size easily inserted, and which carries an upright funnel at the end, or other form of douche which carries the liquid in by gravity is to be preferred. This latter method answers the purpose fully without the danger arising from using too much force. Medicine is injected in the rectum when local action is desired, or when it cannot be retained by the mouth.

It is not an easy matter to locate diseases and injuries of dumb animals and until a reasonably correct diagnosis is arrived at, treatment cannot be satisfactorily administered. Sometimes a horse appears sick and certain kinds of nursing and treatment will suggest themselves for immediate application, although it may be entirely apparent that the underlying cause of trouble has not developed or manifested itself. Study and constant observation are the surest means of attaining confidence and correct judgment in diagnosing diseases of the horse.

CHAPTER XIII.

VETERINARY SUPPLIES AND PRESCRIPTIONS.

Veterinary Supply Table.—Properties and Uses of Medicines.—Useful Prescriptions.

The upbuilding of a corps of veterinarians in the American Army has progressed slowly but steadily, as a knowledge of the importance of the matter forced itself upon the attention of those responsible for the efficiency of the army. Under recent legislation the veterinary corps and its employment has been placed under the direction of the Surgeon General of the army, upon whose recommendation tables of medicines, instruments and other veterinary supplies authorized for the army are announced from time to time. Medicines in the ordinary commercial form are used for the remount stations, at posts and in camps. Medicines in tablet form are issued for field use. General operating, pocket veterinary, post mortem, dental, farrier's and hoof cases, special instruments and dispensary supplies are furnished for the use of veterinary hospitals and for troops on field service.

The veterinary supply table, which has been adopted for the use of the army, does not contain all the medicines used by veterinarians, but is quite sufficient for average troop use. Inasmuch as veterinarians are not available to accompany all detachments, it is very desirable that stable sergeants and farriers should familiarize themselves with the use of simple prescriptions in easily diagnosed cases. As a general rule, however, when a veterinarian is available the operations of the stable detail should be confined to first aid and nursing. An examination of the table of allowances and a study of the simple prescriptions, under the guidance of the veterinarian, will qualify the stable sergeants and farriers to render intelligent assistance in the care and treatment of sick horses. It will also facilitate the discovery of ailments and their causes and enable prompt and accurate information to be conveyed to troop commanders and veterinarians.

VETERINARY SUPPLY TABLE.

VETERINARY SUPPLY TABLE—CONTINUED.

Veterinary panniers, instruments and supplies should be well cared for in order that they may be ready for use at all times, and also that the great expense of the mounted branches of the service may be kept down to the lowest limit consistent with efficiency. A supply of medicines just sufficient for the needs of a command is much more desirable than the accumulation of a large stock apt to deteriorate through age. Requisitions should, therefore, be prepared with great care. Issues should be controlled by the actual necessities of each command and the quantities authorized by the supply table should in no case be considered merely as

expendable allowances. The hypodermic tablets should be administered by veterinarians only.

The accompanying brief descriptions of the properties and uses of medicines, some of which are not on the official supply table, may be useful to those responsible for the care of animals.

Acetanilid.—Used internally in doses of from one to four drams, to reduce fever, and is also used in cases of rheumatism. It is used externally for its antiseptic properties; usually dusted on wounds and is an effectual remedy.

Acid, Arsenious (Arsenic).—An irritant corrosive poison; for external use to eradicate warts apply one part arsenic with eight or ten parts of cosmoline; given internally in doses of one to three grains as a digestive tonic, and for skin diseases, parasitic or otherwise. Used usually in combination with iron sulphate, ginger and gentian. Also given in cases of heaves or broken wind, in three-grain doses, twice daily.

Acid, Boracic.—A valuable non-irritating antiseptic; a 10 per cent solution is useful in conjunctivitis, and abrasions of mucous membranes of the mouth and nasal cavities. Excellent for dusting on wounds of any kind, or as a solution; often used to disinfect the hands, instruments, dressings and sponges before performing operations.

Acid, Carbolic.—A useful antiseptic, disinfectant and odorant; when applied locally is a mild anæsthetic, and is irritant and corrosive; diluted with from twenty to forty parts of water as a dressing for wounds and ulcers; never used full strength. It is volatile and can be used to disinfect stables; the walls, partitions and mangers may be washed with a solution of carbolic acid one to twenty of water. A solution of the acid one part to forty of water, applied to the skin kills acarida, but must be used with caution, not covering too great a surface at a time, as it may be absorbed by the skin and thus poison the animal. In half-dram doses, well diluted, it is sometimes given internally in those dis-

eases caused by micro-organisms. An ointment of one part carbolic acid and six or eight of cosmoline or glycerine makes a useful dressing for scratches and grease heels, and all abrasions of the skin.

Acid, Salicylic.—An excellent antiseptic; is dusted on wounds and indolent sores of any kind; effectual in removing proud flesh; good results are obtained by alternating it with carbolic acid or creolin solution. A 10 per cent solution is about the usual strength. Two parts of the acid to eight of cosmoline makes a good dressing for scratches, wounds and skin diseases. For rheumatism give, internally, salicylic acid one dram, nitrate of potassium, or bicarbonate of soda two drams, repeated twice daily.

Acid, Tannic.—A typical vegetable astringent; may be used to dust on wounds to arrest bleeding, but other agents are usually preferred. It is given internally in relaxed conditions of the bowels, as in diarrhœa and dysentery, with powdered chalk and powdered opium. Dose, one-half ounce.

Aconite, Fluid Extract of.—A dangerous poison; should be used with caution; is useful in the first stages of such diseases as laminitis, enteritis, lymphangitis, pleurisy and pneumonia, and the commencement of fevers where the pulse is strong and full. Dose is from five to ten drops of the fluid extract diluted with water and given on the tongue; repeated every two hours until four or five doses are given. It is also used with a dose of aloes in colic. It slows the action of the heart, contracts arterioles and reduces the volume of blood sent to an organ or tissue, and hence is valuable in reducing or relieving inflammatory conditions. It is used externally with other remedies to relieve local inflammation. A good anodyne liniment for external application is composed of:

Witch-hazel, distilled	5 parts
Camphor, spirits of.....	5 parts
Opium, tincture of.....	5 parts
Aconite	1 part

Adrenalin Chloride (Epinephrin).—Is used as an astringent, hemostatic and local anesthetic, is chiefly used as a local application to arrest hemorrhage; used hypodermically the heart is stimulated directly, but the resistance offered by the contraction of the blood-vessels is such that at times the heart is unable to overcome it and suffers passive dilatation, it excites the sympathetic nerves so as to produce a variety of effects according to the function of the part supplied by the nerve.

Alcohol.—One of the most valuable and important medicines used in making tinctures, extracts and liniments. Given internally as a diffusible stimulant, antispasmodic, diaphoretic, and diuretic. It is also a food, and is readily assimilated. Given internally in cases convalescing from debilitating diseases where the appetite is capricious, it gradually arouses the system and helps to establish convalescence; dose, about one ounce diluted with three parts of water; given in congestion and inflammation of the lungs, pleurisy, colic, indigestion and diarrhoea, three or four times daily; spirits of camphor one ounce, tincture gentian one ounce, aromatic spirits of ammonia one ounce, is good in the later stages of pneumonia; the above tinctures are composed in great part of alcohol, hence their virtue, to a large extent. Externally applied, alcohol is cooling, but when covered with bandages or oiled silk is irritating and may blister. Good when mixed with an equal quantity of water to harden the skin of animals subject to saddle galls. If the skin is broken, mix with equal parts of the whites of eggs, and paint the parts over with the paste until a thick film is formed. Being volatile, bottles should be kept tightly corked.

Aloes, Barbadoes.—When freshly prepared aloes is the best agent for purging the horse. Used in colic, constipation, impaction and indigestion; should not be given in inflammation of the bowels nor where the respiratory organs are affected as in catarrh, congestion of the lungs, inflammation of the lungs, pleurisy or influenza. For a quick action it is best given in solution as a drench composed of aloes six drams, calomel one-half dram,

ginger two to four ounces in a pint of water. A ball is usually composed of aloes six drams, calomel one-half dram, and ginger two drams, made up with glycerine, oil or soft soap, just enough to cause the medicine to adhere. Aloes are sometimes given in one to two-dram doses as a tonic.

When aloes do not act promptly they are sometimes excreted by the kidneys, causing diuresis; in torpidity of the bowels some practitioners add to the ball or solution, one-half to one dram of pulverized nux vomica. Aloes should never be given to pregnant mares, as they are liable to cause abortion. When given as a laxative and aloes do not act, do not repeat but give one pint of linseed oil.

Alum.—A typical astringent and is slightly irritant; generally used externally as a styptic, astringent and desiccant; in ulcerated conditions of the mouth a saturated solution of alum is good; used as a spray or gargle for sore throat; is a soothing application for burns or blistered surfaces; good also for the same purposes when combined with an equal quantity of borax or boracic acid dissolved in water; dusted on an open joint, it often gives excellent results. Given occasionally internally, alum powdered, one dram, opium powdered, one dram, water one-half pint, as a drench; in cases of diarrhœa repeated twice or three times daily.

Ammonia, Aromatic Sp. of.—An expectorant and stimulant; given in cases of chronic cough and in the later stages of pneumonia and bronchitis; is good in cases of indigestion, flatulent and spasmodic colic; in such cases after administering a ball of aloes, give as a drench, aromatic sp. of ammonia two ounces and cannabis indica one dram in one pint of water. Tincture of opium is sometimes given instead of cannabis indica, but practitioners generally prefer the latter.

Ammonia, Solution of.—Is generally used externally as a stimulant; is a constituent of many different liniments;

Ammonia, solution of	I part
Linseed oil	I part

well shaken, and applied with friction is excellent for sore throats. For another good liniment take:

Ammonia, solution of.....	1 part
Turpentine, oil of.....	1 part
Linseed oil	3 parts.

These liniments irritate the skin, but no permanent blemish will result if made as directed.

Ammonia, Chloride of.—Is given to stimulate the respiratory mucous membrane, and the mucous membrane of the intestinal tract, promoting secretion and relieving gastric and bronchial catarrh; given in two dram doses well diluted with water. A cooling lotion for local inflammations the result of sprains and bruises is made of

Ammonia, chloride of.....	4 ounces
Potassium nitrate	4 ounces

dissolved in about one quart of water.

Apomorphinae Hydrochloride.—Is used as an emetic and expectorant, is chiefly used as an emetic. For this purpose it has the advantage that it acts on the vomiting center, independently of a local action on the stomach. As an expectorant it is inferior to other nauseants.

Arecolinae Hydrobromidum.—Used hypodermically for colic, in dose of from one to one and one-half grains, is more powerful as a stimulant to the salivary glands than pilocarpine, and more active as a laxative than eserine.

Belladonna, Fluid Extract of.—An active poison; medicinal doses are antispasmodic and anodyne; they dilate the pupil when given internally or applied externally to the eye, and relieve pain and irritability; belladonna is given internally in influenza, bronchitis, pneumonia, sore throat; to relieve abdominal pain, and in irritation of the bladder, uterus, kidneys or rectum. Used externally in the form of liniments, or added to poultices to allay local inflammation in wounds, frostbites, burns, bruises, cracked heels and saddle-galls. The dose of belladonna is one dram of the

extract and from one to two ounces of the tincture, diluted with four parts of water.

Belladonna, ext. of.....	I dram
Ammonia, aro. sp. of.....	I ounce
Camphor, sp. of.....	I ounce

is good for chronic coughs, laryngitis, sore throat, or affections of the lungs; diluted in one-half pint of water, given three or four times daily. For a tonic give a ball two or three times daily of

Belladonna, ext. of.....	1 dram
Ginger	3 drams
Gentian	2 drams.

Generally given in tetanus in doses of two to three drams, repeated three or four times daily; the solid is better in these cases because of the ease of administration; it is usually placed between the teeth, allowing the animal to suck it at his pleasure.

Camphor, Gum.—Generally used as spirits, or tincture of; prepared by dissolving one part of camphor in seven or eight parts of alcohol; in this form it is applied to sprains, bruises or contusions, and is sometimes applied to wounds. Camphor liniment is made of

Camphor, sp. of.....	2 ounces
Ammonia, Water of.....	2 ounces
Turpentine	2 ounces
Water	1 pint.

This is an excellent liniment; apply externally, well rubbed in, in cases of sore throat; to the sides of the chest in pneumonia, pleurisy, etc.; also used for sprains and bruises. Given internally, the gum is useful in relieving coughs, especially if chronic; camphor gum one dram, belladonna one dram, given as a ball, three times daily.

Cannabis Indica.—An antispasmodic and anodyne; is recommended in colics, acute indigestion, impaction and constipation instead of the preparations of opium; good also in tetanus and

other painful conditions; it relieves pain and irritability without interfering with the secretions of the stomach and intestines; dose, one-half to one dram.

Cantharides, Powdered.—Is generally used for its counter-irritant properties; the following are excellent blister preparations:

Cantharides	1 part
Mercury, biniodide	1 part
Cosmoline	8 parts

or

Cantharides	2 drams
Cosmoline	8 drams.

Capsicum (Cayenne pepper).—An irritant, stomachic and rubefacient; given internally in mild cases of indigestion in combination with ginger and gentian; dose, one-half to one dram. As a tincture sometimes added to colic drenches in one-half to one ounce doses; sometimes added to poultices or plasters for its counter-irritant effects.

Charcoal.—Is used to dust on foul, suppurating wounds; acts as a mild antiseptic, desiccant and removes foul odors. Given internally in one-half to one-ounce doses, in flatulent colic, acute indigestion or where there is fermentation of food, and in diarrhœa. Where water contains organic matter, thoroughly stir in some charcoal and use water after it has settled.

Chlorazene.—Used as deodorant and disinfectant, for wounds.

Chloral Hydrate.—Used as a powerful hypnotic and general depressant.

Copper, Sulphate.—An irritant poison; in medicinal doses it is an antiseptic, astringent and tonic; combined with powdered opium it is sometimes used internally in cases of chronic diarrhœa and dysentery;

Copper sulphate	1 dram
Opium, powdered	1 dram

should be given as a ball two or three times daily, preferably in the morning, for a week if necessary. As a ball with linseed meal it destroys intestinal worms, and is a useful tonic. Externally, undiluted, it is caustic, stimulant and antiseptic; used to dust on wounds having excessive granulation, or proud flesh. For use as an antiseptic for wounds, take

Copper, sulphate of.....I dram
WaterI quart.

Collodion, Flexible.—Is used in making adhesive plasters as applied to some wounds to keep the parts together; it is also used for skin abrasions and some incised wounds, especially in the region of joints; cut or shave the hair surrounding the wound, render it aseptic, then with a camel's-hair brush apply several applications of collodion; it keeps the parts together, and when thus protected wounds readily heal by first intention.

Chloroform.—Is used to render the animal unconscious during painful and prolonged operations, and for such purpose the following mixture will be found excellent:

Alcohol1 part
Chloroform2 parts
Sulphuric ether3 parts.

Given internally in from one to two-dram doses; it is a reliable antispasmodic, stimulant and anodyne; given in colics and acute indigestion. It is also used in making liniment.

Cosmoline.—Is used as a basis for the different ointments, and is excellent for the purpose, because it does not become rancid; useful on abrasions of the skin and minor lesions; it effectually excludes the air and keeps the parts soft.

Creolin.—A very valuable non-irritating, non-poisonous antiseptic, disinfectant and deodorizer; used for all classes of wounds, and is an effectual destroyer of parasites; can be used in almost any strength, but is usually diluted with thirty to fifty parts of water.

Digitalis, Fluid Extract of.—A very dangerous poison; is a valuable heart stimulant and diuretic; medicinal dose of the fluid extract is from ten to twenty drops diluted with four parts of water.

Ether, Nitrous (Sweet spirits of niter.)—A diffusible stimulant, antispasmodic, diuretic and diaphoretic; used in spasmodic colic and other intestinal troubles; congestion and inflammation of the lungs, influenza, pleurisy, etc. For colic mixture:

Nitrous ether	1 ounce
Cannabis Indica	1 dram
Tincture of Ginger.....	½ ounce

dilute with one pint of water or linseed oil. Repeat dose in one hour if necessary.

Ether, Sulphuric.—A diffusible stimulant, narcotic and anæsthetic (local or general). Good in colics and acute indigestion. If given internally, as in colic, give

Ether, sulphuric	1 to 2 ounces
Cannabis Indica	1 dram
Ammonia, aromatic sp.	1 to 2 ounces

diluted with linseed oil; this may be repeated until one quart of oil is given, then water can be used instead of oil. Used externally as a spray to produce loss of sensation of a part in minor operations, such as opening abscesses. Keep bottle tightly corked as it is volatile.

Fenugreek, Powdered.—Is used to disguise the taste and smell of disagreeable medicines, and is valuable for this purpose in one-half dram doses.

Flaxseed Meal.—Principally used in making poultices and balls and as a basis for powders; when thus used helps to disguise the taste of medicines; as a poultice take about one quart of meal, and warm water enough to moisten it thoroughly; medicines are often added to poultices before applying them. Flaxseed is an excellent food; being a natural laxative it is often given along with other

food to horses in poor condition; it aids digestion and improves the condition; in inflammation of the kidneys, bladder or bowels it may be used in the form of tea, which is made by pouring a gallon of boiling water on a quart or two of meal, stirring it for a few minutes, then leaving it to cool and settle; it is then poured off and given in any quantity instead of drinking water.

Gentian.—A bitter tonic and is devoid of astringency; given to improve the appetite; useful in dyspepsia; given in almost any debilitating disease, after the inflammatory stage has passed off; it gradually and permanently improves the appetite, promotes the intestinal secretions and hence is a valuable tonic.

Ginger.—Is often given along with a ball of aloes to prevent griping and to assist the action of the purgative; like gentian, is a useful bitter tonic. When added to colic drenches the dose is from two to four drams.

Glycerine.—Is used principally for external applications; a liniment made of carbolic acid, one dram, and glycerine, eight drams, is much used for scratches, sore heels, chafes and wounds exposed to the air; should be applied once or twice daily. As a dressing for bandaged wounds, use

Creoline	1 dram
Glycerine	2 drams
Water6 to 8 ounces.

This solution is effectual in destroying lice and the parasites of mange; also useful in other skin diseases; it may be used with twice the quantity of water to inject into the rectum to destroy pin worms.

Iodine.—Is an excellent remedy; given internally in doses of one to two drams, no medicine is so effectual in diabetes insipidus; dissolved in half-pint of water and given twice or three times daily, generally effects a cure in three days. Is also given in chronic glandular enlargements, as iodide of potassium, in one-dram doses, twice daily. Equally serviceable in ascites, or dropsy,

and chronic swelling of the legs, especially the later stages of lymphangitis and in hydrothorax. Used externally as a stimulant and blister in chronic enlargements;

Iodide of potassium	1 part
Iodine, crystals	1 part
Cosmoline	6 parts

make an excellent application for such conditions.

Iodoform.—One of the best and most reliable antiseptics in use; is usually dusted on wounds of any condition; an ointment made of iodoform, two parts, and cosmoline, eight parts, is a convenient way of applying it.

Iron, Tincture of the Chloride of.—A valuable restorative and tonic; given internally in purpura, influenza and to anæmic and debilitated patients; it is useful in destroying intestinal worms; dose internally, one-half to one ounce, given in ten ounces of water. For use as a spray in ulcerated conditions of the throat, take

Iron, tr. of	1 part
Glycerine	1 part
Water	8 parts.

Externally it is used for its astringent and styptic properties; two drams to a pint of water injected into the rectum destroys pin worms; a little of the tincture placed upon some cotton and applied to bleeding wounds, arrests the flow of blood.

Iron, Sulphate of.—In one-dram doses is an excellent tonic for any of the purposes for which the tincture is used.

Iron, sulphate	1 dram
Arsenic	3 grains
Fenugreek	½ dram

given in a bran mash, and repeated twice daily is a useful tonic for anæmic or debilitated patients.

Lanolin.—Is used as a base for ointments, the same as cosmoline; is supposed to have greater penetrating power, and like

cosmoline, is bland and non-irritating; used in the same proportions and under the same conditions as cosmoline.

Lead, Acetate of.—A most valuable astringent; given internally it checks hemorrhages from the stomach and lungs, or other organs. Used sometimes to check diarrhœa;

Acetate of lead	½ dram
Powdered opium	1 dram
Water	½ pint

given daily. Externally it is used in solution for local inflammations, bruises, burns, sprains, sore backs, and sitfasts (after the core has been cut out); the following prescription is recommended for the purpose:

Lead, acetate of	1 ounce
Zinc, sulphate of	1 ounce
Water	1 quart.

This is called the "white lotion," one of the most popular and useful preparations in veterinary practice.

Lime, Chloride of.—Is much used as a disinfectant and deodorizer; it is cheap, but the fumes of chloride of lime are disagreeable to horses, therefore other disinfectants, such as carbolic acid and creolin are generally selected for use about stables and aboard transports.

Liquor Cresolis Compound.—Used as a deodorant and disinfectant for wounds.

Lunar Caustic (Nitrate of silver).—Is used to remove fungoid growths or proud flesh and to stimulate indolent sores and ulcers to a healthy action; the sore should be cleaned and while moist the stick of caustic should be touched to all its parts; repeat once daily until a healthy condition is established. To remove the cloudiness remaining after an attack of ophthalmia, apply daily with a camel's-hair brush a solution of five grains of nitrate of silver to one ounce of distilled water.

Mallein.—Used for making test for glanders.

Mercury, Bichloride of (Corrosive sublimate tablets).—A convenient and valuable antiseptic; used in solutions of from 1 to 500, 1 to 1000, or 1 to 2000, for most classes of wounds; effectually destroys parasites infesting the skin; for this purpose do not use too strong a solution; 1 to 1000 is strong enough and do not cover too large a surface at a time; one-sixth of the surface of an animal is enough for one day.

Mercury, Mild chloride (Calomel).—Internally is a cathartic; stimulating the liver, causes increased secretion and excretion of bile; given usually with a ball of aloes. Dose,

Calomel	½ dram
Aloes	6 drams
Ginger	2 drams

made up into a ball with glycerine or molasses. Calomel is almost a specific in thrush; the parts should be thoroughly cleaned with soap and warm water; while moist the calomel should be dusted in and the parts covered with oakum, and a bandage applied, to afford pressure and keep the parts clean. A mixture of equal parts of calomel and iodoform is also good for the same purpose.

Mercury, Biniodide.—Is a penetrating counter irritant; is used in abnormal bony deposits, sprained tendons and bursal enlargements.

Mercury, biniodide	1 dram
Cantharides	1 dram
Cosmoline	8 drams

should be rubbed upon the enlargements every morning until three applications are made; after third application, wait twenty-four hours; then wash the parts carefully with warm water and castile soap, and apply some cosmoline or olive oil. This preparation is good for splints, spavins, sidebones and ring-bones.

Nux Vomica, Powdered.—A bitter tonic (nerve) used to improve the appetite by stimulating nerve force; increases the peristaltic movement of the bowels; given in indigestion, con-

valescence from debilitating diseases, paralysis, influenza, rheumatism and constipation. Dose, one-half to one dram. Given sometimes in half-dram doses to assist the action of purgative medicine.

Oil, Linseed.—Is a good laxative for nearly all classes of patients; the dose for the horse is one pint to one quart, given as a drench; used in colics, constipation and indigestion.

Linseed oil	8 ounces
Aloes	4 drams
Ginger	2 drams

is a good laxative. When aloes do not act, rather than repeat the dose of aloes, give one pint of linseed oil, as it is usually safer.

Oil, Olive.—Used internally for diluting irritating medicines, externally for oiling blistered surfaces, and for making liniments and ointments. Not used much as a purgative.

Oil of Tar.—Is used externally to cure mange, scab and other parasites and skin diseases. Given internally for the cure of chronic cough, in doses of one-half dram; repeat twice daily.

Oil of Turpentine.—Its actions are antispasmodic, stimulant, diuretic and diaphoretic. Given in acute indigestion, flatulent colic, and for the destruction of the internal parasites. When given to destroy worms, the animal's food is to be restricted somewhat; on an empty stomach give one or two ounces, diluted with one pint of water, followed the next morning with a ball of aloes. One ounce in one pint of oil is sometimes injected into the rectum to remove rectal worms. When applied externally it is usually in the form of liniments of various kinds.

Oleum Gossypii Seminis.—Used in place of olive oil.

Opium, Tincture of (Laudanum).—One of the most important medicines with which we have to deal. With its alkaloid, morphine, it is given to relieve irritability, pain and spasms by producing sleep; this, however, is not as noticeable in the horse as in man. Good in inflammation of the bowels, colics, acute indigestion, impaction of the bowels, and to counteract pain of almost

any kind, internally and externally. In all cases of abdominal pain, except inflammation of the bowels, practitioners now generally prefer cannabis indica ; opium dries up the secretions of the bowels and generally in these cases the aim is to augment the secretions. The dose internally is from one to two ounces. Externally is an anodyne ; an excellent remedy to relieve local pain and inflammation is composed of

Witch-hazel	2 ounces
Camphor, sp. of.....	2 ounces
Laudanum	2 ounces.

Morphia should only be prescribed by the veterinarian. Dose, three grains hypodermically.

Opium, Powdered.—Has the same actions as the tincture ; and is generally prescribed in one-half to one-dram doses in cases of relaxed conditions of the bowels.

Pilulae Aloini Compound.—Used as a cathartic.

Potassii Arsenis Tablets.—Used as a tonic and alterative.

Potassium Bromide.—Is given to quiet irritability or excitement ; is peculiarly suitable in cases where convulsions or cerebral excitement are present ; given in doses of from one-half to one ounce dissolved in the drinking water ; may be repeated every two or three hours.

Potassium Nitrate.—Promotes the secretions of the skin, lungs and kidneys, hence is valuable for reducing fever, and to increase the flow of urine. It is given dissolved in the drinking water, or may be mixed with the food. In cases of founder it is a remedy of great value ; dose, two to three ounces, three times daily ; this treatment may be continued for two or three days without danger. As a diuretic, or to reduce fever, give doses of from one-fourth to one ounce three times daily. For use externally, one ounce dissolved in one pint of water is a cooling mixture.

Potassium Iodide.—Acts on the lymphatic system, and is excreted principally by the kidneys, thus acting as a diuretic ; given

internally in the early stages of convalescence in chronic glandular enlargements and to remove the consolidation in later stages of pneumonia, lymphangitis and chronic swellings of the limbs. Is also given sometimes in rheumatism, and some skin diseases. It is useful internally and externally in cases of goitre or swollen thyroid glands of the neck. Dose, internally, one to four drams, diluted with water, repeated twice daily. For external use, take potassium iodide one dram, iodine crystals one dram, rub together in a mortar until both are dissolved; then add eight drams of cosmoline; this makes an excellent absorbent ointment to rub on chronic enlargements.

Potassium Permanganate.—Is used as a disinfectant and deodorizer. Used to disinfect instruments, sponges and dressings; also foul smelling wounds. A 5 per cent solution is generally sufficient.

Quinine, Sulphate of.—An antiseptic, tonic and febrifuge. It improves the appetite and reduces the fever of many diseases. For malaria, lung diseases, pleurisy, pyæmia, septicæmia, and indigestion use one to three drams. For purpura and anæmia give twice daily, quinine one dram, iron sulphate one dram, made into a ball.

Salol.—Is valuable for rheumatism; reduces fever; good in indigestion, especially if there is fermentation of food; is dusted on wounds and is an excellent dressing for burns. When given internally, dose one to six drams.

Sodium Bicarbonate.—Used to correct acidity of the stomach, and as an alterative. It relieves indigestion and flatulence. In cases of chronic indigestion is often used as follows:

Sodium bicarbonate	¼ ounce
Nux vomica	1 dram
Fenugreek	½ dram

repeated twice daily in a bran mash.

A solution makes a cooling lotion and relieves the pain of burns. In combination with potassium nitrate, two drams each, is ex-

cellent for reducing fevers; this may be repeated twice or three times daily.

Sulphocarbolate Compound.—Intestinal antiseptic.

Sulphur.—Is used externally to destroy parasites of the skin, as mange, ringworm, lice, etc. After the parts have been thoroughly cleaned with castile soap and warm water, apply an ointment made of

Sulphur	2 drams
Cosmoline or Lanolin	1 ounce.

It is excellent for disinfecting stables; remove horses, trash, litter, dust, etc., close the openings, take one-half pound of sulphur and one-fourth pound of charcoal; put on a bed of burning coals, placed in a pan or other dish, and let the fumes thoroughly permeate the stables, keeping the building tightly closed for twenty-four hours.

Strychnine.—An active poison used for the same purposes as nux vomica, but should not be given except under the direction of a veterinarian.

Tar, Pine.—An antiseptic, stimulant, diuretic, expectorant; destroys parasites; useful in coughs and bronchitis. It is a stimulant to the skin and is sometimes prescribed for mange and other parasitic diseases, including lice. Also used for thrush and canker of the foot, and sometimes for suppurating corns.

Witch-hazel.—A cooling antiseptic, astringent wash, good for inflamed tendons, bruises and sprains; may be used with an equal quantity of water; for an excellent anodyne liniment, take

Witch-hazel	4 ounces
Camphor, sp. of	2 ounces
Opium, tincture of	2 ounces.

Tincture Stramonii.—Used as an antispasmodic and anodyne.

Zinc Sulphate.—Is a tonic in dram doses, but not so good as iron sulphate, or copper sulphate. Used principally, externally, as a white lotion. (See lead acetate.)

Zinc Oxide.—Is useful to dust on indolent sores ; also dusted on itching conditions of the skin, such as eczema. Useful in scratches as an ointment, prepared of

Zinc oxide	1 part
Cosmoline	6 parts.

Zinc Chloride.—Antiseptic and astringent ; an irritant corrosive poison, caustic when applied to the skin. In a solution of 1 to 500, or 1 to 1000 of water, good for foul wounds. If used carefully, good for excessive granulations or proud flesh.

Hypodermic Tablets.—Atropine, cocaine, digitaline, ergotine, eserine, morphine, pilocarpine, and strychnine are active poisons and should be administered only by a veterinarian.

The following are some of the useful prescriptions which may be prepared with medicines from the supply table ;

ANTISEPTIC PRESCRIPTIONS FOR WOUNDS.

Creolin	1 part
Water	40 parts

or

Carbolic acid	1 part
Water	30 parts

or

Boracic acid	1 part
Water	20 parts

or

Zinc Chloride	1 ounce
Water	1 quart

or

Salicylic Acid	dusted on the parts
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or

Iodoform	dusted on the parts
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or

Boracic Acid	dusted on the parts.
Bichloride of Mercury.....	1 to 1000.

OINTMENTS FOR WOUNDS.

Zinc, Oxide of1 part
 Cosmoline6 parts

or

Iodoform1 part
 Cosmoline6 parts

or

Boracic Acid1 part
 Cosmoline6 parts

or

Carbolic Acid1 part
 Cosmoline6 parts

or

Carbolic Acid1 part
 Glycerine4 to 6 parts

"WHITE LOTION." (Excellent.)

Sulphate of Zinc.....1 ounce
 Acetate of Lead1 ounce
 Water1 quart.

A dram of Carbolic Acid added to this, increases its antiseptic properties.

BLISTERS, OR COUNTER-IRRITANTS.

Cantharides1 dram
 Mercury biniodide1 dram
 Cosmoline, or Lanolin8 drams

or

Cantharides powdered1 dram
 Cosmoline6 drams

or

Iodide of Potassium1 dram
 Iodine, crystals1 dram

rubbed together in a mortar, then add 6 or 8 drams of Cosmoline. This makes an excellent absorbent ointment.

PURGATIVES AND LAXATIVES.

Aloes, Barbadoes	6 drams
Calomel	$\frac{1}{2}$ to 1 dram
Ginger	2 drams.
Mixed with sufficient quantity of glycerine makes a good ball.	

or

Aloes, Barbadoes	6 drams
Ginger	2 drams
made into a ball, or given dissolved in one pint of water.	

or

Linseed Oil	$\frac{1}{2}$ to 1 quart
Ginger	2 drams
Nux Vomica	1 dram
given as a drench.	

DIURETICS.

Nitrate of Potash.....	$\frac{1}{2}$ to 1 ounce
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or

Nitrate of Potash.....	4 drams
Gentian, powdered	2 to 4 drams

or

Ether Nitrous (Sweet sp. of Niter).....	1 ounce
Belladonna, fluid ex.....	1 dram
diluted in 1 pint of water, and given as a drench.	

FOUNDER POWDER.

Nitrate of Potash.....	3 to 4 ounces
Gentian	4 drams.

TONIC POWDERS.

Nux Vomica, powdered.....	1 dram
Sulphate of Iron.....	1 dram
Fenugreek	$\frac{1}{2}$ dram

or

Sulphate of Iron.....	1 dram
Gentian, powdered	2 drams

or

Sulphate of Iron.....	1 dram
Soda Bicarbonate	4 drams

or

Sulphate of Iron.....	1 dram
Arsenic	3 grains
Fenugreek	½ dram

or

Gentian	2 drams
Ginger	2 drams
Fenugreek	½ dram

SPASMODIC COLIC MIXTURE.

Nitrous Ether	1 to 2 ounces
Cannabis Indica	⅛ to ½ ounce
Ginger, powdered	2 drams.

FLATULENT COLIC MIXTURE.

Ether, Sulphuric	1 ounce
Ammonia, Aro. sp. of.....	2 ounces
Cannabis Indica	⅛ to ½ ounce
Ginger	2 drams.

When Cannabis Indica is not at hand one ounce of tincture of opium may be substituted in either of the above colic mixtures.

DIARRHŒA MIXTURE.

Opium, powdered	1 dram
Pepper, Cayenne	1 dram
Tannic Acid	1 to 2 drams.

HOOF OINTMENT.

Cosmoline	4 ounces
Turpentine	1 ounce
Charcoal	1 ounce.

LINIMENTS.

ANODYNE LINIMENT.

Witch-hazel	2 ounces
Camphor, Sp. of.....	2 ounces
Opium, Tincture of.....	2 ounces.

STIMULATING LINIMENT.

Turpentine	2 ounces
Ammonia, Water of	2 ounces
Oil, Linseed	4 ounces
or	
Ammonia, Water of	1 part
Olive Oil	2 parts.

CAMPHOR LINIMENT.

Camphor, Sp. of	2 ounces
Ammonia, Water of	2 ounces
Turpentine	1½ ounces
Water	1 pint.

SOAP LINIMENT.

Castile Soap, 6 ounces cut into small pieces, and macerated with six fluid ounces of dilute liquor Ammonia and one pint each of Alcohol and Linseed Oil; add 2 or 3 ounces of Camphor.

COOLING LOTION.

Nitrate of Potash	4 ounces
Ammonia, Chloride of	4 ounces
Water	1 quart.

FOR REDUCING FEVER.

Acetanilid	1 to 4 drams
or	
Quinine	2 drams
Acetanilid	2 drams
or	
Nitrate of Potash	½ ounce doses
3 times daily.	

CHAPTER XIV.

DISEASES AND INJURIES.

Diseases of the Respiratory System: Common Cold; Pneumonia; Sore Throat; Strangles.—*Diseases of the Digestive and Urinary Systems:* Colic, Spasmodic; Colic, Flatulent; Constipation; Diarrhœa; Indigestion, Chronic; Profuse Urination; Retention of Urine.—*Miscellaneous Diseases:* Glanders; Influenza; Lampas; Lockjaw; Lymphangitis, Ulcerative; Sunstroke; Heat-Stroke; Thumps; Surra.—*Diseases of the Eye and Skin:* Foreign Bodies in the Eye; Laceration of the Eye-lid; Mange; Scratches.—*Diseases of the Legs and Feet:* Broken Knees; Calking; Canker; Capped Hock; Contracted Heels; Corns; Curb; Interfering; Laminitis (founder); Navicular Disease; Pricking of Foot; Punctures of Frog; Quittor; Ring Bone; Sand Cracks; Seedy Toe; Side Bones; Spavins; Speedy Cut; Splint; Swelled Legs; Thorough-Pin; Thrush; Windgalls.—*Bruises, Wounds, and Sprains:* Fistulous Withers; Poll Evil; Sore Back; Wounds; Flesh, Gunshot, Incised, Lacerated, Punctured.—*Sprains.*

COMMON COLD.—This is an acute inflammation of the mucous membrane which lines the nostrils. It is the same affection as cold in the head in the human subject. If neglected the disease may become chronic, and is then known as nasal gleet.

Symptoms.—A snorting cough, loss of appetite, dullness of the eye, rough coat, redness of the mucous membrane lining the nostrils, followed by a thin discharge, gradually becoming thicker and more profuse, characterize this disease. Sometimes a light fever exists, the bowels are more or less constipated, and the throat becomes sore; the glands under the jaw may become inflamed. The two forms are technically called acute and chronic nasal catarrh.

Treatment.—Put the animal in a box stall, with plenty of fresh air without draughts. If the weather is cold, cover with blankets. Give plenty of water, and feed on bran mashes and hay. If the running at the nose be considerable, and the cough troublesome,

relief may be given by steaming the head frequently. This is accomplished by holding the head over a pail of hot water to which one or two ounces of creolin or carbolic acid have been added and then stirring gently with a whisp of hay. In mild cases no other treatment is necessary.

The steaming may be done over a nose bag or gunny sack into which some chopped hay or sawdust has been placed, over which hot water is poured. If the patient becomes feverish, give a dose of nitrate of potassa, one to two drams, daily for two or three days. If constipated use an injection of warm water. In all diseases of the respiratory organs, active purgative medicine should be avoided.

In cases attended by sore throat, which is indicated by difficulty in swallowing, give nitrate or chlorate of potassium in one-dram doses, in half a bucket of drinking water, three times daily. A liniment composed of two parts linseed oil, one part turpentine and one part solution of ammonia, well shaken, should be applied to the outside of the throat and well rubbed in.

PNEUMONIA, OR LUNG FEVER.—This is an inflammation of the lung structure.

Symptoms.—The attack, at times, comes on imperceptibly, and again it appears suddenly without any premonitory symptoms. The attack is generally ushered in by sudden fits of shivering, followed by coldness of the ears and extremities, and other usual signs of inflammation, and a staring coat. The coldness of the extremities is a marked sign throughout the disease. The horse is evidently uneasy, and turns his head frequently around to his chest. The pulse is accelerated, and generally averages about eighty beats to the minute. The temperature in the early stage will be 103° to 106° F. The respiration becomes disturbed as soon as the disease is established. The nasal linings are paler than usual, but as the disease progresses they become purplish, and then of a leaden hue. The horse will stand persistently with

his fore legs wide apart, and his elbows out, to afford greater expansion to his chest. Horses affected with this disease never lie down except for a moment at a time, until extreme exhaustion comes upon them, when death from suffocation rapidly ensues.

A cough may or may not be present. If it accompany the disease it is sharp at first, but as the attack progresses it becomes dry and of a dull character. The disease may attack only one lung, or both. If, during the early stage, the ear be applied to the chest, a confused, humming noise, accompanied with a harsh, dry murmur, instead of the gentle, respiratory sound peculiar to health, will be heard. With increase of the disease the breathing becomes quicker and more labored. The fever lasts from five to ten days. Convalescence is indicated by the return of the pulse to something like its normal condition, restoration of warmth in the extremities, a moist state of the nostrils, and a disposition to lie down for rest.

Treatment.—Laxative food, entire rest, blankets, and flannel bandages should be provided at once; plenty of fresh air in the box stall, but no draughts. The condition of the animal has much to do with the treatment accorded. If the animal is in good condition, and the attack arises from some well-marked cause, give ten to fifteen drops fluid extract of aconite every four hours in first stages, and as much nitrate of potassa, in two-dram doses, as the animal will take in his drinking water. Blankets or cloths wrung out in hot water should be applied to the sides of the chest and covered over with dry cloths or rubber cloth. This should be continued for some time, and when stopped the skin should be dried thoroughly, and liniment of linseed oil and ammonia gently rubbed in, and this covered with dry cloths.

When the crisis is reached, or the febrile stage checked somewhat, tonics and stimulants are used. Whisky or pure alcohol, in one-ounce doses, well diluted with water, may be given, and in many cases carbonate of ammonia, in two-dram doses, in the form

of a ball, may be advantageously used. If the animal is distressed with a cough, a dram each of gum camphor and extract of belladonna should be given four and five times a day. If the attack is the sequel of influenza or catarrh, or occurs in a horse of low vitality, aconite should not be used, but the tonics and stimulants at once resorted to. When the animal begins to convalesce, encourage his appetite with such stimulating food as can be procured, but no corn should be given.

SORE THROAT.—This is an affection arising from inflammation of the mucous membrane of the larynx (Laryngitis) or pharynx (Pharyngitis). Usually both parts are affected at the same time. The common causes are humidity of the atmosphere, sudden changes of temperature, allowing a sweating horse to stand in a draught, bruises external or internal, and by infection.

Symptoms.—Loss of appetite, cough, difficulty in swallowing, with slobbering from the mouth, and sometimes discharging water and food from the nostrils. Increase of temperature and pulse.

Treatment.—Place the animal in a box stall, well ventilated but free from draughts. Give green food and bran mash. Fresh water within reach at all times. If improvement justifies, substitute steamed oats for the mash. The nostrils and lips should be sponged clean at frequent intervals. If the throat is hot and tender, cold applications should be used. If the formation of an abscess is indicated, apply poultices to bring it to a head. Great care is necessary in making an opening for the expulsion of pus: knife should be used only to make opening in skin. As the sore throat improves the attendant fever will disappear; if, however, the fever be high, use cold water injections in the rectum. Never drench a horse suffering with a sore throat.

STRANGLES.—This is an infectious disease, usually attended with an eruptive fever, to which young horses are especially subject. Strangles, distemper and shipping fever are one and the same disease. It usually attacks young horses when first removed

from farms to large stables. Strangles is usually acquired by direct contact with an animal suffering with the disease or through contact with the discharge from an infected animal. The disease is very apt to develop in four and five year old remounts but this is not an unmixed evil if they are in garrison where they can be given proper care, for horses are immune after one infection.

Symptoms.—The horse appears sluggish, looks sick and is off his feed. Fever exists, the temperature rising as high as 105° and 106°; increase in the pulse takes place. Thirst increases and owing to sore throat there is much slobbering in drinking. The coat becomes rough. At the end of a couple of days a cough begins and a discharge from the nostrils takes place, at first watery, but later of a greenish yellow color and sticky. The glands under the jaw, in the intermaxillary space, become swollen. When the discharge from the nostrils has fully developed, the fever decreases. Sometimes the disease is accompanied with deep-seated abscesses which may prove fatal.

Treatment.—When the tumor forms regularly in the sub-maxillary space, and is of the ordinary size, the abscess generally comes to maturity without much trouble or inconvenience. If, however, it is situated high up towards the parotid glands, the distress in the breathing will often be very great, and the fever run high. The great object is to assist nature to develop the eruption fully and quickly, as strangles runs a specific course; hence, good nursing and soft food, on account of the attending sore throat, are the principal things. The appetite must be watched, and tempted with grass, if to be had. Sick animals soon tire of bran mash, so that linseed meal should be on hand to add to the mash or make a separate gruel. Cut hay, steamed, and oats softened with boiling water may be given as soon as the animal can eat. Blankets and leg bandages should be used, and if the legs are cold they should be hand rubbed. No purgative medicine should be given.

During the period when the animal is coughing and the discharge is sticky, steaming will give some relief by allaying inflammation. A little tar added to the hot water for steaming is soothing. The swollen glands should be bathed with warm water and flaxseed poultices. Blisters and irritating liniments should not be applied to the throat.

As soon as the tumor has headed it should be freely opened, for if opened at a favorable point the incision is not so apt to leave a blemish as a ragged natural opening. The abscess must be kept open, if necessary, by a piece of tow, and warm water should be occasionally injected into it.

The tumor does not always form favorably, but sometimes comes on the shoulders or front of the chest, and occasionally on some of the internal glandular structures.

SPASMODIC COLIC.—This is a griping or spasmodic contraction of the muscular coat of any part of the intestines. The usual seat of trouble is the small intestine, although impaction of food in the large intestine may cause it. It is always accompanied by pain of an intermittent character.

Symptoms.—The early sign of colic is sudden pain in the region of the intestines, indicated by the horse looking anxiously around at his flanks. As the pain increases, the animal becomes more restless; paws; kicks at his belly; lies down and gets up frequently; wants to roll over when down. After a time the spasm passes away, to return again after a brief interval with the same signs.

During the paroxysm of pain the pulse is much quickened and the breathing accelerated; during the intervals they return to the normal. During the attack there may frequently be a passage of hard, angular dung pellets. Ineffectual attempts to pass urine are frequently made.

Favorable indications are an increase in the intervals of time between attacks, and each attack becoming slighter than the pre-

ceding one. If the animal passes wind and soft dung, it is a favorable sign. The increase or decrease of the attack is also indicated by the tenseness of the belly, or the reverse. The symptoms are only those of pain, no inflammation being present, and the extremities and skin continuing normal.

Treatment.—The spasms being caused by an irritant of some sort in the bowels, the treatment is directed to removing this as soon as possible. For this purpose administer a drench of two to four drams cannabis indica, one ounce aromatic spirits of ammonia and water to make one pint; or two drams of fluid extract of belladonna, two ounces nitrous ether, and water to make one pint. If a light case, where overloading of the stomach does not exist, give an antispasmodic compound—a minimum dose—of one ounce of sulphuric ether, one ounce of tincture of opium, and one dram of powdered ginger, in cold water.

There are many other simple remedies useful in relieving this trouble. An injection of warm water may be used with the other remedies. Rubbing the belly and legs gives comfort, but some horses are very violent, and must be handled with care. A favorable sign of relief is the free passage of urine. The horse should be watched for several hours after the attack has passed.

FLATULENT COLIC.—This is more to be dreaded than the spasmodic colic. It is apt to be chronic, resulting at times from imperfect digestion.

Symptoms.—There is distention of the belly, which is resonant on percussion. The expression of pain is not so acute as in spasmodic colic, but more constant; there is more or less delirium; the animal is unsteady upon his feet, and his extremities are cold.

Treatment.—Give as a drench two ounces of sulphuric ether, and one ounce aromatic spirits of ammonia, two drams fluid extract of belladonna and water to make one pint. Also use oil and injections, as in spasmodic colic.

In both spasmodic and flatulent colic, if relief is not obtained, the dose should be repeated at intervals of an hour.

In some cases it may be necessary to puncture the animal on the right side, in the triangular space bounded by the vertebræ, the hip bone and the last rib; puncture with a trocar, and leave the canula in the opening temporarily. The trocar should be directed downward and inward. This should be done by a veterinarian or specially trained farrier.

CONSTIPATION.—This exists when the fæces are wholly retained, or are scanty, hard and small.

Symptoms.—When of long standing the coat is rough and staring. There is a slight swelling of the extremities, sometimes, a distended condition of the belly, and loss of appetite. In all cases the animal strains in voiding the fæces, which are usually, though not always, small, hard and dry. There is not usually any sign of pain.

Treatment.—In mild or recent cases the diet should be laxative, and as varied as convenient. An injection of tepid water and sweet oil twice a day for a few days will be useful. In prolonged cases a good purgative may be necessary.

DIARRHŒA.—This is a looseness of the bowels, resulting from a natural effort to expel some irritating substance, or from change from dry forage to green grass. If unchecked the animal loses flesh rapidly at times.

Treatment.—Give a laxative of one pint of raw linseed oil. Give an infusion of gentian, one ounce, and one to two ounces of tincture of opium; feed dry food.

Other remedies recommended are tannic acid, one to two drams; or one ounce powdered opium and one ounce gum camphor, made into eight powders, given at intervals of three hours.

CHRONIC INDIGESTION.—This is a catarrh of the stomach and bowels arising from a variety of causes, as feeding when the animal is exhausted; irregularity in feeding and watering; im-

perfect mastication; irregularities of the teeth and poor or unripe food. Frequently caused by worms.

Symptoms.—Appetite diminished and depraved; constipation alternating with looseness of the bowels; passage of whole grain, impacted masses of hay and much wind. Animal loses flesh and skin appears hard, dry and tight (hidebound). Frequent yawning and turning outward the upper lip. Frequently attended with colicky pains.

Treatment.—Examine the teeth and correct any undue sharpness or irregularity, or remove if decayed. Good water and food, with regularity; if horse bolts his food, spread it out to make him eat slowly. Regular exercise. To counteract excessive gas, give one dram of bicarbonate soda twice a day or one heaping tablespoonful of the soda, powdered ginger and powdered gentian, mixed, twice a day before feeding. The mixture should be dissolved in half a pint of water and given as a drench.

If determined that intestinal worms are the exciting cause give, before feeding, two ounces spirits turpentine and four ounces linseed oil, once a day for four days; then follow with one pint of linseed oil.

PROFUSE URINATION.—This disease, as its name indicates, is characterized by great increase and peculiar alteration of the urine, and the body becomes emaciated. The presence in the system of the poison of glanders, indigestion, or feeding on musty hay or oats, or boiled grain, all tend to produce this condition.

Symptoms.—Excessive thirst and unusual urination, accompanied by depraved appetite, characterize the disease. The mucous membranes are pale and dirty-colored, the breath offensive, and the pulse thin and weak. A rough coat and a disposition to perspire on slight exertion, are accompanying symptoms.

Treatment.—The food should be changed, grass being given, if procurable. If the water is hard, it should be boiled. If the horse can be induced to drink linseed tea, he should have it freely.

As great prostration accompanies this disease, a liberal diet should be allowed, preferably of a laxative nature. Give one-dram doses of iodine three times a day.

RETENTION OF URINE.—Anything which may impede the flow of urine, such as a spasm of the neck of the bladder, cancer of the penis, or dirt in the sheath, may cause the condition. It may result from inability of the animal to rise to its feet on account of some other trouble.

Symptoms.—These are frequent and ineffectual attempts to urinate, although the animal strains and groans with his efforts.

Treatment.—Apply hot cloths to the loins and hand rub the belly ; put on blankets and shake up the bedding, which sometimes causes so much desire to urinate that the horse overcomes his difficulty. If these fail, and a catheter is at hand, relieve the bladder by mechanical means.

GLANDERS.—This is a contagious, malignant and fatal disease, caused by a specific virus or bacillus which gains entrance to the system most easily when the animal is debilitated. Glanders and farcy are regarded as one and the same disease, the former term being applied when the disease manifests itself in the internal organs, especially in the nostrils, lungs and air tubes, and the latter when the principal manifestation is an outbreak of the lesions on the exterior or skin of the animal. Glanders is a constitutional disease communicable to man.

Transmission of the disease occurs by direct contact of the discharges of the glandered animal with the tissues of a sound one ; by swallowing the virus when mixed with food or inhaling it when dried and floating in the air ; or by other means in which it may be introduced. Glanders may affect a horse for a long period in a latent form without being detected. It is particularly insidious in this form because through the use of watering troughs and buckets, feed boxes, bridles, harness, currycombs and other articles it may be transmitted to many animals before its true

source is located. While the discharge from a case of chronic glanders may not contain so many active bacilli as that from a case of acute glanders, if it infects an animal, it will produce the same disease as the latter. The infected case may assume an acute or chronic form, according to the susceptibility of the animal infected; the result does not depend upon the character of the disease from which the virus was derived. Mules are more apt than horses to develop the acute form of glanders. With good care, good food and comfortable surroundings, with little work, an animal affected with glanders may live for many months and perhaps for years. With a few days' hard work, deprivation of food and exposure to bad weather, the latent seeds of the disease will usually break out and develop in an acute form.

Symptoms.—In chronic glanders the symptoms include bleeding from the nostrils without apparent cause; a chronic cough and swelling of a hind leg which may extend from the pastern up to the stifle. The swelling is hot and painful to the touch and renders the animal stiff and lame. Nodules from the size of a shot to that of a small pea form in the mucous membranes of the respiratory tract. They may be just inside the nostrils or on the septum which divides one nasal cavity from the other, where they may be easily detected. They may also form higher up in the nasal cavity, in the larynx, the wind pipe or even in the lungs. The nodules are at first red and hard, but later they soften and become yellow; they soon break, resulting in small ulcers with ragged edges known as chancres. The eruption of the ulcers and the accompanying discharge, which is of a gluey nature sometimes tinged with blood, soon cause an irritation of the neighboring lymphatics. The glands on the inside of the jaws become hard and nodulated, a condition not easily confounded with the puffy swollen glands and tissues found in strangles.

On healing, the chancres on the mucous membranes leave small, whitish pit-like scars, which remain for an indefinite time. In

chronic glanders the animal loses flesh and becomes hidebound; the skin becomes dry, the hair stands on end and a generally depraved appearance results. There is rarely any great amount of fever.

Chronic farcy is characterized by the formation of little nodes, varying in size from that of a buckshot to that of a walnut, on the under surface of the skin and commonly known as farcy "buds." They are hot, sensitive to the touch and soon become soft and degenerate into ulcers. The discharge accumulates on the hairs and forms scabs which gradually loosen and fall off.

The farcy buds occur most frequently on the sides of the lips, the neck, the lower part of the shoulders, the inside of the thighs and the outside of the legs. They may, however, occur on any part of the body. The lymphatic vessels in the vicinity of the ulcers may become swollen and indurated, making cord-like ridges under the skin. They may finally disappear but often form elongated, irregular ulcers. The buds, cords, ulcers and peculiar discharge are the essential symptoms in a diagnosis of farcy.

Acute glanders is characterized by the same symptoms as chronic glanders and farcy, but in a more acute and aggravated form. The temperature rises as high as 105° and the contagion is in its most virulent form. There is a rapid outbreak of nodules in the respiratory tract which degenerate quickly into ulcers with much discharge from the nostrils. There is a cough of more or less severity. Small swellings or "buds," which become rapidly filled with pus, occur over the surface of the body and break into ulcers. The eruption is generally preceded by bleeding from the nostrils, swelling of one of the hind legs and in case of a stallion, swelling of the testicles. Indurated cords and enlargement of the lymphatics occur. As the symptoms become more marked the animal has difficulty in breathing, the flanks heave, and the pulse becomes rapid; the animal fails rapidly and death ensues.

Treatment.—An animal in which glanders or farcy is suspected should be at once isolated, and when the disease is clearly manifested there should be no hesitation about destroying the animal, since no known methods of treatment avail to do more than prolong for a time an unhealthy existence. The difficulty of detection of this disease in its incipiency is so great and the results of an outbreak so much to be feared that the mallein test should be made on every animal before loading for transportation at sea.

The test consists in the injection, beneath the skin, of mallein, a sterilized extract from a culture of glanders bacilli. The character of reaction affords a means of determining the condition of the animal. Before applying the test the temperature of the animal should be taken, and if not normal the cause of the variation should be determined.

The side of the neck is usually chosen as the site of the injection. The parts near the point selected should be carefully shaved and disinfected with a 5 per cent solution of carbolic acid or other antiseptic. Great care should be taken to sterilize the syringe before and after using. A cubic centimeter of mallein is used for each injection.

Beginning five or six hours after the inoculation the temperature should be taken at intervals of one hour for a period of from twelve to twenty-four hours. The reaction, or symptoms shown by the glandered horse, consists in a rise of temperature of from two to five degrees; a large swelling at the point of inoculation, which is extremely sensitive to the touch; a general appearance of illness, and finally a stiffness in the muscles and joints. The existence of these symptoms may be accepted as good evidence of the presence of glanders. In case of a healthy animal or one free from glanders, there may be a small swelling, at the point of inoculation, which disappears in about twenty-four hours, and

a rise of about one degree of temperature, but no appreciable constitutional disturbance.*

INFLUENZA.—This is a contagious and infectious disease, accompanied by fever, great depression and frequent inflammatory complications. The disease is very apt, under certain conditions of the atmosphere, to assume an epizootic form with a tendency to complication of special organs. Under various names, "Pink eye," "Epizootic," etc., it has ravaged the country at times. When the disease gets located in a cavalry command, the latter may be counted out of action for some time.

* Glanders appeared among the horses of the 3d squadron, 14th Cavalry, comprising Troops I, K, L, and M, stationed at Jolo, Philippine Islands. The mallein test was administered to all the animals, one troop at a time, and those that reacted to the test were isolated from the healthy animals and given repeated injections of mallein until reaction ceased. Animals which developed no symptoms of glanders and gave no further reaction to the mallein test were returned to duty. The following is a summary of the tests which began in August, 1904:

Number of cavalry horses in squadron.....	215
Proven infected by first mallein injection.....	72
Proven infected by second mallein injection.....	35
Proven infected by third mallein injection.....	11

Immediately after the first injection the horses (72 in number) which reacted were quarantined in a temporary stable. The second test was applied four weeks after the first. One horse developed glanders ten days after the first injection, and three after the second. These four horses were destroyed. The remaining 68 were ultimately returned to duty in their respective troops and at the expiration of six months continued apparently healthy, no new cases having appeared during that time.

Whether or not the mallein test be ultimately proven to be a cure for glanders, the facts as set forth appear to indicate that the disease in its incipient stages may subsequently disappear without other treatment than injection of mallein.

There has been considerable discussion as to the therapeutic value of mallein but the veterinary medical profession has by no means accepted the experiments so far made as finally determining its value except for diagnosis.

Symptoms.—The animal becomes dejected, inattentive to surrounding objects and stands with his head down. A high fever is rapidly developed. Severe chills ensue. The stupor becomes more marked; the eyes become puffy and swollen, with excessive running of tears. With any attempt at movement the horse staggers and shows a want of coordination of his limbs. There is generally a loss of appetite and an increase of thirst. The legs, sheath and belly become swollen. These conditions all remain during the specific course of the disease, which generally runs from six to ten days.

Treatment.—The aim should be to support the animal through the disease, and enable nature to throw off the morbid material in the system. Exertion of any kind should be prevented. Good nursing, absolute quiet, and food mostly of a laxative character, are prime requisites. Water should be kept where the animal can help itself.

LAMPAS.—This is an active inflammation and swelling of the ridges of the roof of the horse's mouth. It is a trifling ailment.

Symptoms.—The soreness of the palate prevents the animal from eating for a few days, and the inflammation sometimes causes feverish symptoms.

Treatment.—A few days of feeding wet bran and other soft food will cause the inflammation to subside. The brutal practice of burning the palate with a hot iron should never be allowed. If marching where it is necessary to keep up the horse's strength, an early recovery may be induced by scarifying the swollen roof of the mouth in front of the third ridge with a knife or lancet.

LOCKJAW.—This is a disease caused by a specific bacillus often found in the superficial layer of the soil, in manure and sometimes in the dust. It appears to thrive on wounds from which the air is excluded. The disease frequently does not develop or manifest itself until some time after a wound has healed.

The disease is most commonly induced by picking up rusty nails or other bits of iron, causing an injury to the sensitive portion of the foot, but it arises not infrequently from a punctured wound of the back or loins. The disease is very common in the Philippine Islands, arising usually from punctured wounds and has been attended with an almost total mortality.

Symptoms.—The attack is characterized by more or less closure of the jaws; sometimes the teeth are firmly fixed together; also great difficulty in swallowing, rigidity of the limbs, and extreme difficulty in moving. The animal pokes out his nose as if suffering from sore throat. As the disease advances the jaws become so tightly locked that neither food nor medicine can be introduced through them. The ears are held erect and turned to the front, the eyes are retracted, and the haw partially protrudes; the nostrils are dilated. The animal spreads his legs wide apart, and stands persistently with tail erect. The belly is tense and tucked up, and the muscles everywhere stand out prominent and rigid. Obstinate constipation and torpidity of the bladder form a marked feature of the symptoms, which, in general, reach their height in three or four days.

Treatment.—The cause should be sought for. If it is a wound of the foot the offending substance must be removed, and the opening enlarged to give free passage for the pus which has accumulated. The hoof should be pared down quite thin about the hole to make an easy exit for the pus, and a flaxseed poultice applied, to which belladonna is added.

As soon as the attack is recognized, a purgative should be administered. Solid extract of belladonna may be given twice daily: the medicine may be placed in the mouth and allowed to dissolve slowly. Oatmeal gruel in liquid form should be left so that the horse can suck it from a bucket without opening his mouth. During convalescence provide laxative, nutritious food, and give tonics.

Perfect rest and quiet are necessary; the stable should be darkened, and the horse disturbed as seldom as possible, even by the attendant. A pail of water should be left within reach of the horse at all times.

ULCERATIVE LYMPHANGITIS.—This disease prevails in many tropical countries under various local names. It resembles true farcy to such an extent that it was frequently mistaken for that disease during the early period of American occupation in the Philippine Islands although the mallein test failed to produce the glanders reaction. It is caused by a specific parasite, the infection being generally communicated through inoculation of a wound or abrasion of the skin. The period of incubation is variously estimated at from two weeks to three months. It is contagious, being easily communicated by direct contact or through the use of harness, currycombs, brushes, or rubbing against the sides of stalls and hitching posts. Whether the infection may, or may not, be carried by flies or other insects has not yet been established. The disease is attended with some losses, probably not exceeding ten per cent.

Symptoms.—The first symptom usually noticed is a small swelling from the size of a pea to that of a hazel nut, which may appear on any part of the body generally in the vicinity of a wound or where a wound has been, the favorite locations being along the sides, down the front legs, and on the inside of the hind legs. Soon more of the enlargements appear along the course of the lymphatics. They are hard to the touch at first, but soon suppurate, a soft spot appearing in the center of each in from four to five days, and which, on opening, discharges a thick, creamy pus. In some instances the abscesses attain the size of a hen's egg. In the early stage, there is no impairment of appetite, the general health is not affected, and the animal is able to continue his daily work. If, at this time, the disease is energetically combated, it usually terminates with a cure within from one to three months.

There are occasionally refractory cases in which the disease becomes general; the animal is then covered with a mass of abscesses; one or more of the legs may swell to considerable size; complications set in and the general health becomes impaired to such an extent that the animal dies from exhaustion. In some cases ulcers appear on the nasal mucous membrane but they do not have the pit-like depressions which characterize the ulcers in glanders.

The diagnosis of ulcerative lymphangitis differs from that of farcy-glanders in several essential particulars. The discharge in the former is thick, creamy and yellow, whereas in true farcy-glanders it is sticky, bloody and yellow. The irregularity of the location of the abscesses in ulcerative lymphangitis is marked, and the individual ulcers are characterized by elevation rather than depression. There is not much disturbance to the general system in the early stages of the disease and it responds readily to treatment. American horses and mules have responded to treatment much more readily and completely than native ponies. Unlike surra, the disease does not appear to affect carabaos, cattle or other domestic animals.

Treatment.—Heroic treatment is imperative and consists in the prompt opening of all abscesses as they appear, and thorough cauterization to destroy the unhealthy tissue. Pure carbolic acid, powdered acetate of lead or other caustics, and as a last resort the hot iron may be used. After five or six days, and when the wounds appear as healthy granulations, antiseptic dressings or dusting powders—iodoform, boric acid, oxide of zinc, etc.,—should be used. Good results have been obtained through one-dram doses of iodide of potassium twice a day. A cathartic of aloes should be given at the commencement of treatment; a ball composed of one ounce aloes, one dram calomel, one-half dram ginger, and syrup in sufficient quantity to mix, is recommended.

SUNSTROKE.—This is a cerebral trouble produced generally by the direct rays of the sun falling upon the head, in combination with humid atmosphere.

Symptoms.—The animal stops suddenly, drops his head, begins to stagger, breathes with a loud noise, sweat breaks out and pulse becomes very slow and irregular, temperature very high, and often the animal dies without recovering consciousness.

Treatment.—Cold applications of water or ice on the head ; cold spray over the body with hose ; cold injections in rectum, and give stimulants, which may be repeated in one hour if necessary. The animal should be placed in the shade and kept as cool and quiet as possible.

HEAT-STROKE.—This is caused by excessive exertion and the over-heating of the whole body.

Symptoms.—The animal usually requires urging for some time previous to the appearance of any other symptom ; perspiration is checked ; breathing hurried ; eyes watery or bloodshot ; nostrils dilated and very red gradually turning purple ; pulse rapid but weak. If recovery takes place, convalescence extends for a long period.

Treatment.—Practically the same as for sunstroke.

THUMPS.—This is a spasm of the diaphragm caused by over-exertion.

Symptoms.—Severe shocks, accompanied by a dull thumping sound, may be observed in the left side and flank. The horse breathes with a quick jerking expiration.

Treatment.—Absolute quiet is essential. Give two ounces of aromatic spirits of ammonia in a pint of water, or two ounces sweet spirits of niter and two drams fluid extract belladonna in a pint of water. If necessary repeat either dose in one hour.

SURRA.—This is a fatal disease which prevails in many tropical countries under various local names. It is caused by a specific infection, the parasites being known under the general term of

Trypanosoma, which is also responsible for the tsé-tsé fly disease of South Africa. The disease is not confined to horses and mules but affects other animals; the parasite has been identified in carabao, camels, monkeys, dogs and rats.

Surra occurs over large areas of tropical countries and is usually more severe during the rainy season. The disease has raged in Burma and China where the temperature ranges generally lower than in the Philippine Islands. The disease has been reported in India, Persia, Syria, Tonquin, Java, Borneo, Madagascar, Egypt and South Africa and in all cases the fatal nature of the malady has been the same as in the Philippines. The difficulty and expense attendant upon bringing animals from the United States caused every effort to be made to find some treatment or cure which would save them to the service. No doubt good nursing and some forms of treatment prolonged the lives of many surra infected animals. The final result shows, however, that these efforts were not only of no avail but in the end were harmful, in that surra cases were kept at stations until the disease had been communicated to many other animals which might possibly have been saved. As soon as the deadly nature of the disease became positively known, the gravity of the situation was recognized and every effort was strained towards prevention rather than further attempts at cure.

While the origin of surra may be in doubt, it is now generally recognized as more prevalent in wet weather, probably because the carriers of infection are more numerous then, than during the dry season. It is accepted as the result of much experiment that the disease once introduced is rapidly disseminated through the agency of flies and other insects. The age, sex and breed of the animals seem to play no part in the dissemination of the disease. Native ponies seem to possess no advantage over imported animals. It has heretofore been accepted that the disease originates in the horse through eating grass cut from marsh or over-

flowed land but the results of the most recent experiments in the Philippines are opposed to this theory. The consensus of opinion of recent investigators is that the disease is not communicated through the taking of infected water or food into the system *so long as the mucous membranes are sound*. When infection occurs through the alimentary tract, it does so through a wounded mucous membrane. The infection may be conveyed by a change of bridles between a sick and a well horse; through a healthy animal licking sores on a sick animal; by grazing over the same ground or drinking from the same vessel; *the infection takes place only when the parasite is introduced in a wound or lesion* of the healthy animal. The common means of transmission are biting and stinging insects, certain flies, and, to a less extent, fleas being the usual agents. The infection is due to mechanical transmission of the parasite. It has been determined that some kinds of animals harbor the parasite with little or no inconvenience, and this furnishes a possible means for carrying the elements of disease over from year to year. Recent scientific investigation in the Philippines has failed to produce the slightest evidence that infection by food or drink ever occurs through sound mucosa.

Symptoms.—The first symptoms to be noticed are dullness and a rise of temperature and the appearance of the parasite in the blood. For some days a remittent or intermittent fever may be the only evidence of sickness. One of the earliest symptoms following a rise of temperature is the pallor of the mucous membranes, which first become pearly white and later take on a decided yellowish tinge. In some cases the submaxillary glands become swollen and sensitive to the touch. Respiration is quickened and in many instances more or less labored. The animal gradually becomes stupid; a watery, catarrhal discharge takes place; the hair looks rough and sometimes falls out in places; marked emaciation develops; edema of the genitals and surrounding parts and of the belly appears; this swelling may extend forward

between the fore legs and to the chest. The edema also extends to the hind legs, being most marked below the hocks; the fore legs may be involved but usually to a less extent. A partial paralysis of the hind quarters usually occurs which causes the horse to stagger when in motion and is very characteristic.

The parasites are numerous in the blood during the first few days after the rise of temperature, following which they mysteriously disappear. This appearance and disappearance may take place a number of times during the course of the disease. In the later stages of the disease parasites may be found in the blood in larger numbers and with a higher temperature than at any time previously. There has been a wide divergence of opinion as to the period of incubation of the surra parasite when introduced into the system of a horse. The most recent data has justified the fixing of a much shorter period than heretofore, being generally within ten days, and in a large majority of cases between four and seven days.

There are usually no intestinal symptoms of importance and the appetite remains good except at the height of the fever. In many cases a severe diarrhoea develops a few days before death.

Anemia is progressive and is a constant, prominent symptom. The discharge from the eyes, at first watery, gradually becomes very tenacious and solidifies in the corners of the eyes. In some stages of the disease various skin eruptions occur, frequently resulting in localized ulceration. As the disease progresses, thirst increases, the body becomes more and more sluggish, the animal hangs its head and is heedless of what is going on about it, paying no attention to swarms of flies. The pulse is at first normal, but the heart becomes weaker, the edema increases and death from heart failure generally occurs. The course of the disease varies greatly in individual cases, some dying suddenly and others lingering for many weeks.

Treatment.—The mortality experienced in the Philippine Islands has been total, and until scientists discover some means of rendering animals immune, the only safe plan is to isolate each animal coming under suspicion and as soon as a diagnosis of surra is pronounced the animal should be destroyed. The isolation of suspicious cases should be as complete as possible and protection should be directed so as to include flies, mosquitoes, fleas and rats: this is the only way to prevent infection being carried. Experiments have disclosed that flies can transfer the parasites on their probosii or feet and infect a wounded surface within 24 to 36 hours after leaving a surra affected animal.

FOREIGN BODIES IN THE EYE.—These are generally seeds, particles of hay or straw, or small grains of dirt. The trouble usually occurs at night, and is indicated by tears more or less profuse running from a closed eye.

Treatment.—The particles will be generally found under the upper eyelid, which may be gently turned back over a pencil or other smooth article, and the irritating substance removed; afterward bathe the eye in lukewarm water, and cover it with a wet cloth.

LACERATION OF EYELID.—This usually occurs from being bitten by another horse, or striking against nails or splinters while rubbing against the stall.

Treatment.—No part should be cut away unless it is so badly lacerated as to make reunion improbable. There is a strong natural tendency to reunion of these parts, and with judicious management a successful result is often obtained even in very severe injuries. The parts may be brought together with two or three stitches. A wet cloth should be hung over the eye, and care taken to prevent the animal rubbing against the manger.

MANGE.—This disease depends upon the presence of a parasitic insect, which is so minute as to be seen only with much difficulty. The attacks cause itching of the skin, and the hair falls off in

patches. Any horse affected should be isolated, and other animals should not be groomed with the same brush and currycomb. It generally commences at the roots of the hair of the mane and tail. Minute pustules appear, the summits of which gradually expand, burst, and coalesce with one another, and the united discharge from them forms patches of crusts upon the skin. It is under these crusts that the hair loosens and falls out.

Treatment.—The treatment of mange must be thorough to be effective. The parts affected should be washed with soap and water, and be dressed with a solution of carbolic acid in the proportion of half an ounce of the acid to a pint of water, going over a part of the horse each day. In slight and recent cases the skin will recover its tone when the mites have been killed, and in most cases the hair will grow out again. Only a small portion of the affected surface, not exceeding an eighth, should be covered each day, for the carbolic acid, if too freely used, may be absorbed by the skin and poison the animal. Creolin is much safer in the farrier's hands and is quite as effective. A solution of one part creolin to thirty or forty of water may be used with impunity, or a mixture of five parts creolin and twenty parts cosmoline may be applied after washing.

SCRATCHES.—This is a condition of the skin in and about the hollow of the heel akin to chapped hands; it is also called cracked heels. It is usually produced by exposure to wet and cold. In the chronic form it is known as grease. Clipping of the long hair or fetlocks, which is the natural protection of the parts, is apt to produce it.*

Symptoms.—Lameness, more pronounced when starting off. Dry, inflamed condition of the skin about the heel, and formation of small crusts, from which a thin, watery discharge exudes.

* In preparing his troop for the annual visit of the Inspector-General during the spring, the author was misled by a spell of warm weather, and premature shedding of the horses, and in consequence had all the fetlocks trimmed. On the day of the inspection a cold rain set in, and almost the entire troop broke out in a few days with clearly defined cases of scratches.

Treatment.—Keep the parts dry, if possible. If necessary to wash, do so with warm water and castile soap, and dry thoroughly. If the skin be unbroken, rub with fresh lard and vaseline. Dust with powdered alum twice a day. If cracked, rub with one part oxide of zinc and six parts of cosmoline, mixed, or one part sulphur to six of cosmoline. It is a troublesome affection, and if the animals are in camp, and exposed to standing on muddy picket lines, it is very difficult to cure.

BROKEN KNEES.—Under this name are included all injuries to the knees, from a simple scratch to serious fractures of the bones, and which usually arise from a fall.

Treatment.—If the skin is simply bruised, the hair scraped off and a little blood oozing from the surface of the skin, a dressing of white lotion will probably heal it, and the hair will soon grow again.

When the skin is cut, wash it thoroughly to remove dirt and foreign substances, clip away the hair, bring the edges together, and fasten with plaster. Put a muslin bandage around the knee. In all cases the limb must be kept as free from motion as possible. Tie up the horse's head so that he cannot lie down for a few days, and where he will not be apt to strike his wounded knee against the manger.

If inflammation sets in free exit must be allowed for pus, and hot fomentations applied until it subsides, after which the healing process may be encouraged by cold applications. A pledget of wool or tow, covered with white of egg and placed on the wound, and a wet pad bandaged lightly over this, will exclude air and dirt.

If the tendon is crushed the case may become so serious as to call for the destruction of the animal, as is done in case the accident has been sufficiently severe to fracture one or more bones of the knee.

CALKING or TREADS.—This is an injury of the coronet, generally inflicted by the shoe of the other foot, or by the foot of another horse in the herd, or in ranks.

Treatment.—Remove any jagged ends and apply tincture of arnica. Keep the wound clean, and bathe three times a day with white lotion. If neglected it may terminate in quittor.

CANKER.—This is a morbid secretion of the sensitive frog and sole, involving the corresponding insensitive parts. It usually has its origin in neglected thrush, but it may be due to constitutional causes. Both thrush and canker are very prevalent in the Philippine Islands, probably owing to the dampness and mud which prevail for a greater portion of the time in that climate.

Symptoms.—These consist of an abundant, fœtid, and colorless discharge from the frog, which is large, spongy, and covered by a fungoid growth, intermixed with offensive matter.

Treatment.—This consists in the complete exposure of the diseased surface, in the application of pressure, and in thorough dryness. The diseased portion, including the sole, must be removed, and the surface of the cavity burnt with a hot iron; dress with powdered calomel or sulphate of copper daily. The sole is then covered with dry tow, and the foot enclosed in bandages or a leather boot.

CAPPED HOCK.—Synovial capped hock is a firm, fluctuating swelling on and about the point of the hock, resulting in lameness and sometimes decay of the bone. The injury is usually caused by striking the hocks in kicking or while in the act of lying down or getting up.

Treatment.—Use either applications of hot water or cooling lotions to reduce the swelling, then apply a blister. The swelling usually becomes chronic.

CONTRACTED HEELS.—This is a shrinking of the tissues of the foot and drawing together of the heels which is very common among horses. It usually affects the fore feet. It is often

found in the feet of horses raised in marshy districts and transferred to streets and stables where there is little moisture. The common causes of contracted heels are faulty shoeing, cutting away bars, frog and heels and rasping the hoof wall.

Symptoms.—The foot has lost its circular shape and the heels are drawn together so much that the circumference of the foot at the bottom is less than at the coronet. The frog is much shrunk and is pinched up between the heels instead of being in contact with the ground. The sole is very concave and the whole hoof is hard, dry and lifeless. On first leaving his stall the animal is stiff and inclined to walk on his toes.

Treatment.—It is most difficult to ameliorate the condition of contracted feet if the animal must continue at work on hard roads. Stop rasping the hoof and cutting the bars, frog and heels and keep the feet moist. If possible, remove the shoes and turn the horse out in a moist meadow pasture. If the animal must continue at work, reset the shoes frequently and do not use calks unless absolutely necessary. Owing to a tendency to cause stumbling it is a serious disease for a cavalry or saddle horse.

CORNS.—Corns are bruises of the sole, usually occurring in the angle formed by the bars and the crust in front of the heel. They are rarely found on the hind feet. Corns are very similar to blood blisters on the human skin, and are probably formed suddenly by a bruising blow. An indirect cause of corns is bad shoeing, the practice of filing off the crust to make a good-looking foot from the horseshoer's point of view, and also from the senseless and brutal practice of cutting out the bars. Sometimes they are probably caused by stepping on a stone. When the horse goes lame from no other known cause, apply the pincers, as before described, to various points, with firm pressure, until the flinching of the horse shows that the right spot has been found.

Treatment.—The treatment usually consists in removing the cause, which is nearly always undue pressure of the shoe. Paring

out corns gets rid of them for a time, but it should be borne in mind that the only means of preventing a recurrence of them consists in the maintenance of a good, sound, unrasped crust and unpared bars, in order that properly fitted shoes may have a correct bearing.

CURB.—This is an inflammation of the ligament, accompanied by a hard and painful swelling at the back of the hock, usually caused by a sprain. In the earliest stages it shows itself as a small, hard lump or ridge upon the lower part of the back of the hock about five inches below the point. As the disease progresses, it is often accompanied by lameness of a severe character. Hocks which are much bent are peculiarly liable to curb and other ailments resulting from sprains.

Treatment.—Reduce the inflammation by fomentations; use a high-heeled shoe, and apply a blister to stimulate absorption of the exudation. If the inflammation subsides and the lameness continues, firing may be tried.

INTERFERING.—This is striking a fetlock with the opposite foot, causing a contusion, often abrading or scratching the surface, and commonly occurring with the hind feet only. Horses when much fatigued are apt to interfere, particularly if badly shod. Injury is sometimes occasioned by a poorly clinched nail. The occurrence is generally indicated by the horse flinching, and if badly struck he may carry the injured leg off the ground for several steps. Proper shoeing is the best remedy. Leather pads are used with driving animals to receive the blow and prevent cutting the leg.

LAMINITIS or FOUNDER.—This is an inflammation of the sensitive laminæ which cover the outer and upper surface of the coffin bone, and is known commonly as “founder.” The original attack is always acute. It may be entirely relieved, but often a change of structure results from the effects of the acute attack. It is very painful and is attended with much lameness. The pain is due to confinement of the products effused by the inflammation

within the outer hard case of the foot, and the pressure thereby caused on the sensitive structures of the interior.

The immediate cause most frequently is concussion. It may occur in all the feet, but the fore feet are more often affected than the hind ones. Concussion, over-exertion and indigestion are frequent causes.

Symptoms.—The attack occurs very suddenly. The horse can hardly be induced to move. He seems as if all his body was cramped. There is heat in the feet affected. As the seat of the disease is in the front portion of the feet, the animal will save that portion of his feet as much as possible by throwing his weight on his heels. On account of the pain the pulse is always accelerated.

Treatment.—Endeavor to relieve the local inflammation within the feet. Mild purgatives should be given, and if the bowels are torpid, use injections of warm water. Aloes or strong cathartics should not be given.

Remove the shoes, and rasp the wall down level with the sole, so as to allow it and the frog to bear the weight. Do not pare the sole.

Give laxative food, and plenty of water. Give two ounces of the bicarbonate of sodium twice a day in the food, and if the fever be high give a drench of from fifteen to thirty drops of tincture of aconite in water, and repeat at intervals of four hours. Put the feet in a tub of warm water, and also apply poultices for a few days. Give plenty of bedding, as the horse should lie down as much as possible.

NAVICULAR DISEASE.—This, in its primary stage, is inflammation of the lower side of the navicular bone. After a time the tendon which passes under the bone, and its cartilage and bursa become involved. The navicular bone acts as a roller for the tendon which passes under it, and is attached to the coffin bone, and hence is peculiarly liable to suffer from the effects of con-

cussion. It rarely affects the hind feet, and is most frequently seen in fore feet with narrow and high heels. The inflammation once set up in the bone leads to a variety of changes both in its external and internal structure.

Symptoms.—Lameness may appear suddenly and without any apparent cause. It may disappear, and after a time reappear, either in the same or in the other foot, and thus go on for some time. In time the symptoms become more marked, and in most cases the first sign is "pointing of the toe" in the stable, or when at rest outside, followed by shortness in the step and lameness. The foot and the horse may be examined and nothing wrong be found. The animal may appear sound one day and have a return of the lameness the next.

With the symptoms described, if no other cause such as corns or laminitis can be found, and there is no external heat or injury, it is quite safe to diagnose the case as navicular disease.

Treatment.—The shoes should be taken off and the frogs allowed to touch the ground. The feet should be placed in a cold-water bath for some hours during the day, and a linseed meal poultice applied at night. The animal should be encouraged to lie down so as to get the weight off his feet, and he is likely to do so if isolated in a dark stall. At the end of a couple of weeks, blister the coronet mildly. Sometimes it is well to insert a seton in the frog.

Horses are sometimes "nerved" for this disease, but such animals soon break down, and are obviously unsafe for military service.

PRICKING OF THE FOOT.—This is caused by nails actually penetrating the sensitive laminae which line the interior of the horny substance of the foot, or by their being driven into the soft horn which surrounds them. In the latter case it may be a week or two before the lameness disappears. Picking up a nail produces a similar wound, and this is liable to occur at any time a horse is

in use. An injury of this kind should be promptly treated, as it may result seriously, even producing lockjaw.

When the sensitive sole is injured, inflammation almost always occurs, terminating in the formation of pus, which unless aided to escape, may burrow its way up and form an opening upon the coronet, producing a fistulous wound called quittor. In any case the horse shows lameness.

Treatment.—If not readily seen, the exact point of the lameness may be detected by pinching around the foot with a pair of pinchers, one branch being against the outside of the hoof while the other presses the sole inside of the shoe. The injured spot being found, draw the nails from the shoe, carefully watching each as it comes out. If one appears wet, it is probably the cause of the trouble.

In all cases it is essential to pare out freely, not merely the seat of puncture, but the surrounding sole for a considerable distance, with the view of affording an easy exit for any matter which may form. The foot should then be soaked in hot water for at least an hour.

Having taken these precautions in cases treated immediately after the occurrence of the injury, that is, before inflammation has begun, close the puncture at once with tar and tow, to exclude the air and lessen the chance of inflammation. Perfect rest should be given.

As a rule, inflammation will set in and the formation of pus commence before the injury is noticed. In addition to paring the sole, recourse must be had to poultices of linseed meal. The insensitive sole having been pared off, the horse will not be fit for work until nature has resupplied enough of it for the protection of the foot, unless an artificial covering such as a leather shoe is provided. When prompt measures are taken, injuries of the sensitive sole seldom prove serious.

PUNCTURES OF THE FROG.—These are similar in character to those of the sole, and require similar treatment. They nearly always arise from picking up a nail. When taken in time they yield to treatment more readily than prick of the sole. If neglected, however, they are apt to lead to extensive disease of the frog, and canker may be the result. In rare cases the navicular bone may be punctured, when perfect recovery need not be expected.

QUITTOR.—This term applies to several varieties of foot affections wherein the tissues undergo degeneration and are eliminated or sloughed off by suppuration. Its more common form is a fistula of the coronet, which burrows in various directions, with usually several openings upon the quarters and heels of the coronet. The most common cause is a severe tread or bruise on the coronet. It may also arise from a neglected corn or prick of the sole and may involve not only the subcutaneous tissues but also the tendons of the leg, ligaments of the joints and the bones of the foot.

Treatment.—The first thing is always to afford an easy exit for the pus. Pare the sole clean, to see if the trouble has been caused by a wound in that part. If it has, cut down into the sole and open a channel for the pus to escape downward. If no sinuses have formed, apply a linseed poultice, followed by a zinc and lead lotion. Great care must be taken, as in all cases of confined pus, to prevent the external sore from healing over before the internal disease is entirely eradicated.

RINGBONES.—These are bony deposits upon either the upper or lower pastern bones. A ringbone may originate in heredity but usually comes from a colt being put to work too early in life or from bruises, blows or strains. The degree of lameness does not depend upon the size of the deposit.

Symptoms.—Enlargement just above the coronet or on the upper pastern bone. It is not easy to detect in its incipency and is not usually recognized until ossification is established. The

horse may go lame upon leaving the stable but appears to recover when warmed up with exercise. Lameness is more perceptible on hard than soft ground.

Treatment.—Trim the hoof so as to balance the foot and prevent abnormal strain. If inflammation still exists, at the time the trouble is discovered, apply a blister of biniodide of mercury and cantharides and let the animal rest for a month at least. If this fails, point firing may be tried. The hot iron should be touched well to the bone as superficial firing is of no value.

SAND CRACKS.—These are cracks in the fibers of the hoof wall, running up and down, amounting sometimes only to a flaw, and at others to a fissure entirely through the substance of the horn. Cracks are sometimes caused by brittleness of the crust, arising from the practice of cutting away the sole and rasping off the hoof. The brittleness may be constitutional, some horses being evidently predisposed to it. The cracks may also be traced at times to contracted heels, aggravated, if not produced, by cutting away the bars or opening the heels.

These cracks do not ordinarily cause lameness until sufficiently deep to expose the sensitive laminæ, or until they reach the coronary band. They then become very painful and the lameness is extreme. They become so bad at times as to open and close as the horse raises and puts down his foot.

Treatment.—With a knife scrape the sharp edges of the crack to its bottom, until a clean groove has been formed. Wash out with zinc and lead lotion, and blister the coronet, rubbing it in every two or three days, to stimulate the formation of new horn.

If the crack does not extend the entire length of the hoof, draw a deep transverse furrow with a red-hot iron at either end or both, sufficient to stop the crack from extending, but not deep enough to cause pain.

Toe cracks usually extend the entire height of the foot, and expose the flesh, which is apt to become granulated. These

granulations should not be removed with caustic, which only inflames the tissues more than before. When they have appeared, cut them away with one stroke of a sharp knife. The flow of blood which follows will be of advantage to the parts. Bathe with white lotion twice a day.

When the inflammation has subsided, the fissure may be drawn together by cutting a niche about a quarter of an inch deep, half or three-quarters of an inch from the crack on each side, and driving a flat horseshoe nail through from one to the other; the ends should be drawn together and clinched with pincers. It should be kept in mind that the horn of the hoof is thick below, and thin towards the coronet, so that nails cannot be driven very high up.

Clasps are manufactured for drawing together quarter cracks, owing to the difficulty of using nails advantageously on the thin quarters of the hoof.

Shoeing with tips, and also with three-quarter bar shoes is advantageous in treatment of toe and quarter cracks.

SEEDY TOE.—This term is applied to a separation of the outer wall or crust of the hoof from the inner layer of soft horn derived from the laminæ. It is caused by an unhealthy secretion of the lower portion of the laminæ, which is incapable of maintaining the union between the structures. The disease always commences in the lower portion of the laminæ, and extends upward and laterally. Though called seedy toe, the disease frequently affects the quarters.

Treatment.—Cut away all that portion of the crust which has become detached from the laminæ, and if the disease shows signs of extending, such further portions as may be necessary. Apply a bar shoe with a toe clip, blister the coronet every other day, and cover the exposed surface every day with an ointment of melted lard and beeswax, into which turpentine is stirred. This will keep out moisture. Feed liberally, and keep the foot dry.

SIDEBONES.—This consists in ossification of the elastic lateral cartilages, or wings of the bone of the foot. Nature supplied cartilage instead of bone in this part, in order to give elasticity toward the heels, and any alteration, such as conversion into bone, interferes with elasticity, although it may not occasion lameness. In light horses sidebones are seldom visible to the eye, but their existence may be ascertained by feeling the wings of the bone of the foot.

Treatment.—There is no cure, but if the cartilages are still undergoing change, blistering the coronet will hasten the process.

BONE SPAVIN.—This disease generally appears on the inner side of the hock, and usually involves two or more of the weight-bearing bones. Spavins once fully formed cannot be removed by any remedial agent, but in common with most abnormal growths, become less as age advances. The common causes are undue concussion, pressure or sprain. Hereditary influence has much to do with production of spavin. Spavin is serious in its inception and in its progress and when once established is most destructive of the value and usefulness of the horse.

Symptoms.—During the formation of the bony deposit some degree of abnormal heat may be detected, but usually the disease first makes its presence known by the prominence of the bony growth, which destroys the symmetry of the hock. Some stiffness of the hock and an occasional tripping of the toe may be noticed. Peculiarities will be observed when the animal is trotted on hard, smooth ground, especially when turning, for the horse is apt to flinch perceptibly. Exercise for a few minutes greatly diminishes the symptoms, but after exercise and the horse has cooled off, the stiffness will recur, probably in an increased degree.

If the horse is worked during the formation of a spavin, the inflammation will greatly increase, and an enormous deposit of bone may be the result. The deposits may be on both hocks, but they are rarely similar; therefore by comparing one hock with another it can be determined if anything abnormal exists.

If spavin is suspected and any doubt exists, lift the hind leg and forcibly flex it up to the thigh several times. After this trot the horse slowly, and if he has spavin he will probably show lameness.

Treatment.—If incipient spavin be suspected, rest is the great essential. Cold applications are useful, and tincture of iodine may prove beneficial, a dram being injected under the skin in each of from two to four places. If the inflammatory action does not subside, and the horse continues lame, it will be well to use a blister. If properly performed, firing is regarded as an efficacious remedy.

BOG SPAVIN.—This is a distention of the capsular ligament of the true hock joint. The swelling, which is tense and fluctuating, shows itself primarily in front and the inner side, because in that part the capsule is large and loose. It is a defect commonly occurring in weak hocks, and may become serious.

Treatment.—This should be directed toward allaying pain and reducing its size, but the swelling should never be punctured. A wet bandage covered with oil silk, and the whole covered with a flannel bandage, often acts favorably. If these measures fail, a stimulating ointment may be used, but as a rule blisters do not prove permanently beneficial in this disease.

BLOOD SPAVIN.—This is a distention of the veins in the vicinity of the hock. No great harm results from the dilatation of the vein, although it is both a blemish and a defect.

SPEEDY CUT.—This is an injury caused by a fore foot wounding the opposite leg immediately below, and sometimes even above the knee. It is usually inflicted at a gallop when the horse has begun to tire. The blow frequently causes the formation of pus.

Treatment.—If pus is present open the abscess freely to give it vent; bathe with warm water and a weak zinc wash.

SPLINT.—This is a deposit of bone, either between one of the two small bones and the cannon bone, or upon any of the three bones of the fore leg. The deposit generally develops on the inner

side, and usually a little above the center of the cannon bone between the knee and fetlock.

A simple splint in a position removed from either articulation or tendon is not looked upon as serious, or classed as an unsoundness; all other forms are liable to cause lameness, and are indicative of more disease than is apparent. There should be classed under this head those close to the knee; double or pegged splints, that is, those which are found on both sides with a communicating bar running from one to the other and which passes between the bone and the tendon in rear; two or more on the same side connected, and finally, little bony deposits involving the knee joint.

Treatment.—If a splint does not cause lameness it should be let alone. When once fully formed it cannot be removed, but often becomes absorbed as the horse grows older. A bandage wet in cold water, and rest, will usually be sufficient, but if the horse continues to go lame after a rest of a month or six weeks, and the splint is still sensitive, it may be advisable to apply a blister composed of one dram of biniodide of mercury and five drams of cosmoline.

SWELLED LEGS.—This is commonly called stocking, and is usually occasioned by want of exercise. It will generally disappear when the animal is exercised or worked.

THOROUGH-PIN.—This is a bursal enlargement which occurs at the upper and back part of the hock, extending across the joint from side to side between the bones. In a medium form it is common in cavalry horses. Unless very pronounced, no treatment is required. Cold applications, pressure, or counter irritation, are used in bad cases.

THRUSH.—This is a disease of the frog accompanied by a foul discharge. As the disease advances fissures occur in the side of the frog close to the heel, from which foetid matter exudes. The condition is generally brought on by wet, unclean stalls, or dirt of some kind, such as stopping the feet with dung. In a con-

tracted foot the sole is lifted off the ground to such an extent that from want of use the frog frequently becomes diseased. Paring the frog has a similar tendency.

Treatment.—If it originates from dirt remove the cause, and keep the frog clean and dry. Any ragged parts should be removed with a knife, so as to open the cracks in and around the frog. Having removed the cause, endeavor to absorb the discharge. This will be best effected by daily applications of calomel, powdered sulphate of copper or iodoform. Apply pad of oakum to keep foot clean. Pine tar is also a good dressing for thrush.

If thrush be long neglected the neighboring parts become affected, and in bad cases the whole of the sensitive sole becomes involved.

WINDGALLS.—These are soft, pulpy swellings in the neighborhood of the fetlock joints. They vary from small to the size of a hen's egg. They are quite common with old cavalry horses, and arise from over-exertion and irritation, rather than from sprain. As they are very apt to return, and they do not specially inconvenience the horse, it is not customary in the military service to subject them to any treatment.

FISTULOUS WITHERS.—This is the presence of an abscess more or less formidable at the withers, caused by pressure of the saddle or other bruising injury. In most cases the mischief is at first slight, and a few days' abstinence from work, with a little alteration of the saddle, if that caused the trouble, will generally effect a cure and prevent recurrence. If the skin is tender a salt and water dressing may be applied.

When, however, the cause is continued or repeated, the tissues under the skin become inflamed, and the cartilaginous pads of the ends of the spinous processes may be injured. If such be the case fomentations must be applied in the first instance to reduce the inflammation. If these fail, matter will probably form under the skin.

Unless a free opening is made for its escape it will burrow in, under, and among the muscles, tendons and ligamentous tissues which lie on each side of the spine or withers, and will form sinuses. A seton should be introduced to enable the pus to escape, and prevent caries of the spinous processes. If the latter occurs the diseased bone must be removed. The parts frequently heal over nicely, with perhaps a slight hollow, but a serious case is apt to subject the horse to suspicion, as not being suitable for hard service with packed saddles.

POLL EVIL.—This is a fistulous abscess situated on top of the head immediately behind the ears, and is usually caused by pressure of the head-stall or accidental violence. At the first stage it may be recognized as a soft, fluctuating tumor, surrounded by inflammatory swelling, and attended with stiffness of the neck. From the peculiar position of the injury, the matter has no depending orifice, and unless artificial assistance by free incision is given for the escape of the matter, it will burrow downwards among and under the ligaments which support the head. Among these it is apt to form large and deep sinuses, which often extend down to the bone.

Treatment.—Before pus is formed, reduce the inflammation by the application of cold water to the part, and by administering purgatives internally. If suppuration becomes established, the abscess must be opened at once to its base, so that the pus may escape from the lowest point. The opening must not be allowed to close too soon; fomentations should be repeatedly applied. In some cases, a seton inserted from the original opening, following the fistula and brought out on the opposite side of the poll, are very successful.

SORE BACK.—This may take the form of slight tumors, sitfasts, or saddle galls. They are generally caused by friction or undue pressure of the saddle, and in the case of team horses, of the harness or collar. Improper saddling, or poor riding with good

saddling, have the same effects. In tropical climates or in hot weather sore backs become quickly virulent unless carefully treated at once.

Treatment.—The most essential thing is to remove the cause of the irritation and the animal should, if possible, be spared from work for a few days. Such alteration as is necessary in the equipment should be made. The blanket may have holes cut in it over the swelling, or the corners turned under to raise the saddle bars, when the tumor or abrasion is near the edge of the saddle. With pack animals, the hay or stuffing must be altered, hard lumps removed, and, if necessary, a chamber or hole left over the affected spot. The aparejo is the best pack saddle in existence for heavy loads in the hands of experts, but if not continually watched, will, in the hands of poorly instructed troops, ruin all the mules in a few days' marching.

The tumor, or swelling, will be best treated at first by an application of salt and water. If the irritation is not removed, and there is sign of suppuration, it must be treated according to its nature and degree, by application of poultices of linseed meal mixed with boiling water, and sweet oil stirred in afterwards.

Fluctuating tumors sometimes require to be laid open through the center from end to end, and injected with a weak solution of one part carbolic acid and fifty parts water, and cold dressings applied afterwards until healed.

When one of these swellings, either through neglect or repeated recurrence of the cause, has become hard and insensible, and the skin is permanently injured, it is then known as a "sitfast," because of the difficulty of removing it or effecting a cure. The skin becomes thickened and half dead, and is often adherent to the bottom of the sore. The sitfast will frequently be found to be partially separated all around from the living skin. The surest treatment then is to cut it out. Remove every particle of the hard, horny skin, after which it may be carefully touched with nitrate

of silver, to remove any of the disorganized part which has been left by the knife.

True elastic skin of the original quality is never reproduced when once destroyed, either in the case of sitfasts or of any other injuries; a substitute is formed which answers sufficiently well in most cases, and the parts will frequently contract in such a way as to leave only a small scar. Care should subsequently be taken not to bring undue pressure on the part.

Sometimes the saddle or harness will abrade the skin. If not attended to, these "galls" may run into ulcers. As soon as observed, the saddle or harness should be shifted so as not to rub on the sore spot. If the skin has not been broken, it may be hardened by rubbing with a weak solution of salt and water. If a scab be rubbed partly off, trim away the edges, and if necessary, poultice it until it all comes away.

In warm weather the woolen saddle blanket produces much heat, and care should be taken to cool off the horse before exposing the back. This will tend to reduce swellings arising from ill-fitting saddles. The back should be carefully examined when the saddle is removed, and the salt and water immediately applied to any swelling. If there is no abrasion, massage treatment will be beneficial. If the skin has been rubbed off and a raw spot formed it should be treated with cosmoline, or carbolized oil. The "white lotion," composed of one ounce sulphate of zinc, one ounce acetate of lead, and one quart of water, is a valuable dressing for sore backs. If necessary to continue the horse in use, the open wound should be covered with cosmoline, and if it is possible to remove part of the load it should be done, and a hole cut in the blanket as before mentioned.

In tropical service, sores, abrasions and wounds are encountered in comparatively large numbers. In addition to the lotions and powders prescribed in the chapter on veterinary supplies, several dusting powders have been found valuable in the Philippines.

Among the best of these for open wounds is one composed of equal parts of alum sulphur and charcoal. Another is composed of one part iodoform and eight parts tannic acid.

FLESH WOUNDS.—These may be gunshot; incised or clean cut; lacerated, where the skin is torn and broken, with edges more or less ragged and uneven; punctured, or those whose depth is much greater than the entrance aperture; and contused wounds, or those produced by concussion without perforation of the skin. They are more or less the result of accident, except those inflicted in battle.

There is a greater disposition in the horse than in man to suppurative action. Wounds of any extent seldom heal completely in the horse by direct union or by adhesion. In all wounds it is an object of much importance to keep the parts in a state of rest. In some parts a certain degree of motion cannot be avoided, but an endeavor should be made to lessen it as far as possible. In some cases the animal will have to be tied up to prevent his moving, and in others a cradle will be needed to prevent his gnawing the wound with his teeth.

Wounds healed by granulation must fill up from the bottom gradually, and they should be prevented from closing outside. This may be done by inserting a piece of dry lint or tow between the edges of the wound. For wounds to be healed by granulation there is no better dressing than lint steeped in cold water. This may be covered with oil silk, to retain the moisture. Great care should be taken to prevent infection of wounds. Antiseptic dressings should be used on unclean wounds.

Unhealthy granulations or proud flesh, must be kept in check by application of some caustic, such as sulphate of copper, nitrate of silver, or chloride of zinc.

Sutures are useful in bringing together the edges of the skin in parts where there is but little flesh, such as on the forehead and the nose, but they do not answer so well for fleshy parts, where the needful apposition of the parts is best maintained by bandages.

Sutures are best applied by means of a curved needle. Interrupted sutures answer better than continuous ones. The twisted suture, made by two needles and a skein of silk twisted over them, answers very well in small incised wounds.

Bandages should be adjusted very evenly, and not so tight as to obstruct circulation. When circumstances admit of it, the bandage should be applied above and below, but not over the wound. Iodoform or acetanilid should be dusted over the wound before the bandage is applied.

If there is any hemorrhage it should be stopped at once by the application of styptics, cold or pressure. Oakum or tow bound over a wound will often stop hemorrhage.

In the general treatment of wounds, attention should first be directed to cleansing the injured parts from all foreign bodies, by allowing lukewarm water to fall in a stream over it, one per cent of carbolic acid being added to the water. Abraded surfaces should be touched as little as possible. Splinters, gravel, and all foreign substances, if not too deeply imbedded, may be removed with forceps.

GUNSHOT WOUNDS.—If a wound has been made by a bullet, a careful examination should be made to ascertain if the ball has passed through or out of the body. If not, the probe should be introduced, and if located it should be cut out if possible. Some times a ball may be so lodged that it cannot be removed, and it may become encysted and remain without giving rise to any inconvenience. It is often difficult to locate a bullet, as it is very readily deflected by resistances met with after entering the body. Should bones be struck by a ball, they are frequently shattered and splintered to such an extent as to warrant having the animal destroyed.

Apply hot fomentations, or poultices to which carbolic acid has been added, to the wound until suppuration has been fairly established. Should pus accumulate in the tissues, openings must be made at the most dependent parts for its escape.

INCISED WOUNDS.—Under this class come those made by some sharp instrument or body. The edges of the wound are smooth, as though cut with a knife. If they occur in fleshy parts, and blood vessels, tendons or joints are not injured, they soon recover, often with little or no special treatment. Bleeding is more apt to occur in wounds of this kind than any other. If from arteries, the blood is bright red or scarlet in color, and flows in jets or spurts; if from veins, it is darker, and the flow is regular. If the bleeding is from an artery, pressure should be applied between the wound and the heart; if from a vein, between the wound and the extremities. The bleeding stopped, the wound should be cleansed, but an incised wound should never be rubbed with any coarse substance.

If the wound is parallel to the muscular fibers, it does not open to any extent, but if the incision be across the muscles, gaping ensues. In the former case stitches may be taken to hold the parts together; in the latter a properly applied bandage, bringing the edges of the wound together, is preferable. The bandage should be applied so as to encourage union from the bottom, and prevent accumulation of pus. An antiseptic wash should be applied, and if necessary, the wound may be gently cleaned with a soft sponge, and castile or carbolic soap and hot water. Meddling with and frequent dressings of such wounds do more harm than good.

LACERATED AND CONTUSED WOUNDS.—These may be described together, although in contused wounds there is no break of the skin. Lacerated wounds are usually also bruised or contused to a greater or less extent. Such wounds may not at first seem as serious as incised wounds, but they are commonly very much more so. In severe contusions, infiltration of blood takes place into the surrounding tissues; mortification follows, often involving deeper seated structures, and resulting in abscesses.

In lacerated wounds the amount of hemorrhage is generally small; the edges of the wound are ragged and uneven. These

wounds are commonly produced by some blunt object, as where a horse runs against fence posts, corners of buildings, trees, wire fences, etc.

After a thorough exploration, such wounds should be carefully fomented with warm water, to which has been added three parts of carbolic acid to one hundred of water. Free exit for pus must be secured. If the orifice is found to be too high, or if pus is found to be burrowing in the tissues, an opening low enough to drain it must be made.

There are usually soreness and considerable inflammation in lacerated wounds, and warm linseed poultices may be used effectively in many cases.

PUNCTURED WOUNDS.—These are produced by the penetration of a pointed substance, sharp or blunt, such as a thorn, fork or nail, and are apt to be neglected or remain undiscovered, by reason of the opening being insignificant as compared to the depth. They are very common in the feet and legs, and in board stalls, where nails work loose from the rubbing and kicking of the horse, they occur in the face, neck and exposed parts of the body. Treatment is the same as in simple gunshot wounds.

Punctured wounds in the fetlock, knee, hock, stifle or other joint, are always serious, and frequently result in stiffening or ankylosis. These must be looked for in winter campaigns, when horses are shod with ice calks. After the wound has been examined and cleaned, if inflammation has not set in, apply a cantharides blister over the joint. This treatment operates to prevent ingress of air by swelling of the skin and tissues underneath, and also the superficial inflammation established acts to check deep-seated inflammation. If the joint fluid is escaping it must be stopped; treat with cooling lotions and a paste of flour and alum, or ten grains of chloride of zinc to an ounce of water. Medicine should be applied on pledgets of tow held in place by bandages. Such wounds require much time and perfect rest for a cure. Slings are very useful in many cases.

It may be remarked that in all injuries where the true skin is destroyed it is not reproduced. Its place is supplied by a cicatrix, which differs from true skin in not containing hair follicles.

SPRAINS.—The muscles, tendons and ligaments are all subject to over-strain, producing inflammation sometimes of a serious character. The sprain may arise from over-work, a slip or a fall, and is usually indicated by swelling, heat, pain and loss of function.

Treatment.—Perfect rest in a stall with a level floor. The animal should not be moved if it can be avoided. Hot or cold applications should be applied to the injured parts. Witch hazel should be added to cold water in which bandages are saturated. The bandages should not be allowed to dry on the injured parts. If pain is severe, a warm application of 1 quart of water with 4 ounces tincture of opium, and 2 ounces of acetate of lead added should be made several times daily. If the parts remain large and swollen after the inflammation is reduced, tincture of iodine should be rubbed in twice a day. If this treatment fails to restore the parts in a reasonable time, a blister of 1 dram cantharides, 1 dram bromide mercury, and 8 drams cosmoline or lanolin may be applied.

The foregoing descriptions of diseases and injuries, and methods of treatment, by no means include all those known to veterinary practice.

CHAPTER XV.

FORAGE.

Grasses in General.—Hay: Upland; Lowland; Wet Meadow; Good; Inferior; Mow-Burnt.—Dust in Hay.—Haystacks.—Timothy; Red Top; Bermuda Grass; Orchard Grass; Kentucky Blue Grass; Clover; Alfalfa; Buffalo Grass; Gramma Grass; Gietta Grass; Blue Stem; Blue Joint; Fodder or Roughness.—Weight and Measurement of Hay.—Oats.—Corn.—Barley.—Bran.—Palay.—Allowance of Forage for Public Animals.—Standard Weights.

Grasses in general are of greater economic importance in furnishing food for man and animals than all other plants. The truth of this will be recognized when it is considered that all the staple cereals, as wheat, rye, barley, rice, oats, etc., are grasses. They have been cultivated for a long time, but there can be no doubt that they were originally selected from wild forms on account of the size, quantity and nutritive value of their grains. This was the beginning of agriculture, and agriculture made possible the numerical increase and diffusion of the horse, as well as the human population.

All cultivated grasses were once wild, and are still so in their native homes. The selection and cultivation of particular kinds of grasses with reference to their grazing qualities, and for the production of hay, is a comparatively modern practice. In the early history of this country, while the settlements were sparse, the natural pasturage was abundant, but in the course of time the farms began to crowd each other, and the open range for feeding becoming restricted, the domestication of wild grasses was compulsory.

The cultivation of perennial rye grass began early in the seventeenth century, and was about the only grass so cultivated for nearly one hundred years. Timothy, or Herd's grass, named after



Figure 105. Timothy.

TIMOTHY HERD, its discoverer, was cultivated in America about 1720, and was not introduced into England for more than forty years after. This has continued to be a popular grass for hay down to the present time, and divides in favor with blue grass, orchard grass and red top, according to locality.

The variety of plants and grasses used for forage is very large, and consists of both wild and cultivated species. The number of species of grass now catalogued is over 3000.

The plains lying west of the one hundredth meridian, together with much mountainous and broken interior country, are unreliable for the ordinary purposes of agriculture, but are very valuable for the pasturage afforded by the native grasses, which are celebrated for their rich, nutritious properties, ability to withstand dry seasons, and for the valuable property of self-drying or curing on the stalk. This property is not possessed ordinarily by grasses at lower altitudes than 3000 feet above the level of the sea. "Bunch grass" is a term used to describe many of these species because of their peculiarities of growth.

Hay is the natural food of the horse, and upon it alone he is able not only to sustain life, but can at the same time do a fair amount of work. It is rich in materials for repairing waste of the animal tissues, and aids digestion of the more concentrated foods. It loses in value the more it is handled, because of the breaking off of the tender flowers and leaves, and for this reason, when it is necessary to transport it to any distance, it should be baled.

Hay is usually classed as upland, bottom, or wet meadow.

Upland hay, which is the best for horses, is known generally by the fineness and firmness of the stalks and the narrowness of the leaves.

Lowland hay is characterized by the coarseness of the stalks and by the broad leaves of its grasses. This hay, though coarser, is softer, less firm and crisp than upland hay, and the color is darker.



Figure 106. Redtop.

Wet meadow hay is recognized by its very coarse, often reed-like stalks, and by the broad, flag-like leaves, and also by the admixture of water-rushes and sedge.

Good hay should be moderately fine, sweet-smelling, well cured, and have a good, fresh color. The flowering heads of the grasses should be present. A proportion of herbage other than grass is desirable, but no weeds. It should be cut as soon as it matures and before the seeds are fully ripe. Much judgment is necessary in harvesting and storing or stacking hay. Musty hay is not fit for horses, and great care must be taken to properly cure it before it is put in the stack or barn, in order that there should be no danger from heating. Hay is not improved by keeping over one season.

Hay may be composed of the very best varieties of grasses and yet be inferior because cut too late or badly saved. Hay is usually cut late for one of two reasons: the farmer either delays in a dry season, hoping to secure a heavier yield, or the season may be so wet that the cutting is deferred for fine weather. As the seeds ripen much of the nutritive value of the plant passes into the seeds, which usually fall off as they ripen, and are only valuable for reproduction of their kind; it is for these reasons that hay should be cut while the plants are flowered and before seeds form.

Any considerable amount of rain falling on hay causes it to lose its characteristic odor and to have a lusterless, washed-out color, according to the amount of exposure to which it has been subjected.

Mow-burnt hay is a term applied to hay which has heated in the stack, either from being stacked before thoroughly cured or whilst wet with dew or rain.

Dust in hay commonly arises from the hay having become slightly damp, and afterwards quickly dried without passing into the stage of mouldiness. The apparent dust is the debris of the outer coats of the stems and leaves, which decay and fall off in the process of heating which has taken place as the result of having

Figure 107. Bermuda Grass.

become damp. Dust may also arise from hay having been overdried before being stored, or from having been much exposed to bad weather. In any case and from whatever cause it arises, it must be regarded as an unfavorable feature in hay.

In the United States there are many climates, varieties of soil, geological formations, and variations in degree of moisture and dryness; it is apparent, therefore, that no one species of grass can be equally well adapted to growth for hay in all parts of this extensive territory.

It would require a separate volume to describe all the grasses and plants useful for feeding to domestic animals. A very brief reference only is made to those in common use for animals in the public service, and which officers are called upon constantly to inspect before purchase under contracts.

In addition to those mentioned, the entire area of the United States, particularly the Western plains and Rocky Mountain regions, is more or less covered with various kinds of bunch grass, all very good for pasturage, and many for hay, except the annuals which, as a rule, do not seem to have sufficient nutritive qualities for horses engaged in marching or heavy work. This refers particularly to grasses which spring up after rains, and grow rapidly to great height in a few weeks.

Timothy.—(Figure 105.) This is extensively cultivated as a hay crop in all the older agricultural sections of the country; the height of the grass varies according to soil, from one to three feet; it has a fine seed top; thrives best on moist, loamy soil, of medium tenacity; is not suited to light, sandy or gravelly soils; is perennial, and yields as high as four tons to the acre. It is often sowed with clover, and makes the best hay for horses of all known grasses.

Redtop.—(Figure 106.) This is extensively cultivated as a hay crop; the height of the grass varies from two to three feet; it makes a firm sod; is a perennial grass; it thrives in swampy

Figure 108. Orchard Grass.

meadows and is much valued by dairymen. It makes hay in large quantities.

Bermuda Grass.—(Figure 107.) This is the most valuable grass in the South; it spreads rapidly by means of its roots, and is difficult to eradicate when once located; its chief value is for summer pasture; it is much used as a lawn grass, and for terraces and embankments; it is affected but little by droughts, and it yields from a ton and a half to two tons per acre; is a perennial.

Orchard Grass.—(Figure 108.) This is a very popular grass in the eastern and northern states; it grows to a height of three feet; is a perennial; is adapted to a wide range of soils, climates and treatments, making good winter pasturage; when cut for hay it affords a heavy aftermath; it yields on medium land from one to three tons of excellent hay, and is easily cured and handled.

Kentucky Blue Grass.—(Figure 109.) There are several well-marked varieties of this grass. It is extensively used for pasturage; it does not afford so heavy and profitable a hay crop as some other grasses; it attains its highest luxuriance and perfection as a pasture grass over the limestone formation of middle Tennessee and Kentucky; it accommodates itself to a great variety of soils and climates, and does not run out on good land; no reasonable amount of grazing can destroy it; it is a perennial.

Clover.—This family embraces a large number of plants, varying greatly in size and quality. It is not deemed necessary to illustrate a plant so familiar in Europe and America. The most common varieties are the red and the small white or Dutch clover.

Clover is one of the most important of cultivated grasses, not only for feed, but as an improver of the soil. It is usually sowed in conjunction with some other grass. It lasts several years, but is frequently plowed under as a fertilizer before it runs out.

It is not suited alone for grazing, except for a few minutes at a time, as it is apt to bloat both horses and cattle. It yields about two tons or more to the acre, and will grow best on clay loam, although it thrives even on sandy soil.



Figure 109. Kentucky Blue Grass.

Alfalfa.—(Figure 110.) This plant is known in Europe as lucerne, and has been cultivated for hay since ancient times. It is not so hardy as red clover, and not adapted to cold climates. It thrives best in a permeable soil, and is well adapted to, and reaches its highest development in the warm and dry climate of the Southwest, where irrigation is used. Its roots sometimes penetrate fifteen to twenty feet in the soil; it is best used as a soiling plant, but is much used as a hay in California, the Rocky Mountain region, New Mexico, Arizona, and the far West generally; it affords two or three cuttings a year, yielding two or three tons per acre at each cutting, and lasts without replanting for some years; it is not well adapted to transportation owing to brittleness.

Buffalo Grass.—(Figure 111.) This grass is extensively spread over all the region known as the Plains; it is very low, the bulk of leaves seldom rising more than three or four inches above the ground; it grows in extensive tufts, or patches, and spreads largely by means of off-shoots similar to those of the Bermuda grass; it formed the main supply of food for immense herds of buffalo, antelope, and other game which formerly existed in the West; next to gramma grass, it is perhaps the most valuable plant of the region in which it thrives.

Gramma Grass.—(Figure 112.) This is the commonest and best grass in the far West; it grows in small, roundish patches, the foliage being in a dense cushion, like moss; the flowering stalks seldom rise over a foot in height, and bear near the top one or two spikes each about one inch long, standing out at right angles; when much grazed these spikes are eaten off and only the mats of leaves are observable; it is highly nutritious, and stock of all kinds prefer it to any grass growing with it; it dries and cures on the ground so as to retain its nutritive properties in the winter. For many years after troops occupied Arizona and New Mexico this grass was cut with hoes and used as hay, with roots and dirt hanging to it; the horses kept strong and fat on it.



Figure 110. Alfalfa.

Figure 111. Buffalo Grass.



Figure 112. Gramma Grass.

Gietta Grass.—(Figure 113.) This is one of the characteristic grasses of the arid districts of Texas, New Mexico and Arizona, where it is sometimes erroneously called black gramma. It is found sparingly in Colorado and Utah. It is relished by cattle and horses, and is next to the gramma in value in those regions. Like the gramma grass, it can only be cut with hoes, knives or scythes.

Blue Stem, or Western Blue Joint.—(Figure 114.) This species prevails on the plains from Texas to Montana, and is well known to stockmen. It is generally of a light, bluish-green color. It is the most prized of the native grasses, and wherever it occupies a large area exclusively, as it frequently does, it is cut for hay. It does not yield a great bulk, but its quality is unsurpassed. In the valleys and along the streams it frequently forms large patches, and grows thickly and abundantly. This grass extends into the mountain region, and is common in Colorado and New Mexico.

Blue Joint.—(Figure 115.) This is a stout, tall grass, growing chiefly in wet, boggy ground or moist meadows; its favorite situation is in cool, elevated regions. It prevails in all the northern portions of the United States and in British America; in these districts it is one of the best and most productive of the indigenous grasses. It varies much in luxuriance of foliage, according to location; it grows from three to five feet high, with leaves a foot long. While not equal to some upland grasses, it gives a larger yield, makes very good hay, and is much relished by horses and cattle; is perennial.

Where there is any choice of grasses the best should be insisted upon for hay. What is considered good in one locality is often regarded with contempt in others. The government is frequently compelled to accept inferior hay in the absence of any other kind. Wild mesquite beans were at one time received as forage in the absence of other available food in Arizona, and the horses got along very well, and continued to do their regular work. Among the common grasses accepted at times for hay may be mentioned



Figure 113. Gietta Grass.

white or tall gramma, crow-foot, various reed grasses, wild oats, and several kinds of bunch grass.

During the Civil War the animals were frequently dependent upon the broad leaves of the cornstalk, called "fodder" or "roughness" in the South. When pulled off at the right time and properly cared for it makes a palatable forage, but is not to be compared with good timothy or other hay.

In the Philippines no hay is cured and public animals are fed partly on green corn or sorghum stalks; teosinte, a forage plant resembling corn, and sacate which is a tall watery grass grown in overflowed land or rice fields. All of these classes of forage plants are palatable and relished by the animals but there is not much nutriment in any of them.

Hay for the army is usually delivered baled, or in stacks. Hay baled when wet will rot just the same as loose hay. A sufficient number of bales should always be opened to determine its condition, unless a government agent witnessed the baling.

Haystacks must be built solidly, neatly topped, and raked from the peak down, to facilitate the shedding of water, otherwise the rain may penetrate, and not only turn the hay black and rot it in places, but may cause the entire stack to become musty and worthless.

Cured hay from the grasses herein described varies greatly in weight per cubic foot. Officers are continually required to approximate the amount of hay in stacks at various military stations, and the only correct method of determining this with any approach to accuracy, is to cut from the stack a sufficiently large cubic section to obtain a fair average of the stack, and weigh it so as to get the weight of a cubic foot; the measured cubical contents of the stack multiplied by the actual weight of a cubic foot, will give the weight of the stack. It must be remembered that the top is lighter per cubic foot than the lower portion of the stack, which has been well packed as the stack was built up. Allowance must also be made for the sloping ends.



Figure 114. Blue Stem, or Western Blue Joint.

It will usually be found more satisfactory to estimate the volume of the solid stack separately from the volume of the lighter and peaked top. Obtain the weight of a cubic foot of each and multiply by the volume, adding the two results together for the total weight. This does not require much time or labor, and is infinitely preferable to guess work.

Oats are the best of all grains for supplying animals with muscular tissue, and are easily digested. They should be clean, plump and full of flour, and have a metallic luster. It is not material whether they are of the white or black varieties, but they should be free from all appearance or odor of mustiness, mouldiness or sprouting, for these defects are productive of serious digestive disorders. In a sample of oats the grains should be about the same size, and there should be no admixture of small seeds of grass and weeds. Oats containing small pebbles, grit and dirt, even if otherwise good, should be rejected until cleaned.

New oats have almost a glazed appearance, which is lost in old oats, and the former have a fresh, earthy odor, which disappears in the latter. The taste of new oats is fresh and somewhat milky. The beards are well defined in new oats, but in old oats they are knocked off by the friction of handling, being very brittle.

Corn is one of the best foods for producing fat, but that is seldom desirable in saddle horses. It is good in cold climates on account of its heat producing qualities. In warm weather it readily undergoes fermentation, causing derangement of digestion, which is a prolific source of disease and death in horses. This is particularly the case in early spring. It is fed whole or crushed, the latter being preferable, particularly for old horses. It should not be fed mixed with other grains.

Barley is seldom received by the government, except in the Southwest, where it grows to perfection under irrigation. The animals there thrive upon it and keep in good, hard flesh under heavy work. It is frequently threshed with horses or sheep, and consequently very poorly cleaned.



Figure 115. Blue Joint

Bran is a very valuable component of the forage ration. It is rich in muscle-making constituents, prevents constipation when given as a mash, is slow to ferment, easy to digest, makes good poultices, and is easy to transport, though bulky. It supplements, but does not take the place of grain.

Palay, as unhulled rice is called in the Philippine Islands, was the main reliance of the cavalry horse which went out during the early days of the insurrection. The animals refused it at first, but they soon learned that it contained the necessary qualities to supply the nutriment needed to keep them up on some of the hardest marches of the whole campaign.

The forage supplied animals in the public service varies somewhat with locality. Hay, oats, corn, bran, and sometimes barley, are the components of the forage ration in the United States. In the Philippine Islands, American horses learned to eat unhulled rice (*palay*) and appeared to thrive on it. The native ponies are fed on *palay*, *tique-tique* (ground rice) and *miel*, a species of coarse molasses which is poured over the rice meal. They are also fed large quantities of a very watery grass called *sacate*.

The allowance of forage is ample for all ordinary purposes, and where grazing is abundant and opportunity is afforded the animals to avail themselves of it, a portion of the allowance can be saved.

The forage allowance is fourteen pounds of hay per day for each horse and mule, and one hundred pounds of straw for bedding for each animal per month. Grain is issued at the rate of nine pounds a day for mules and twelve for horses. In special cases of exposure, when the necessities of the service demand an increase, three pounds additional grain may be authorized for each animal daily. The allowance for native Philippine ponies is thirty-three pounds of green forage and when this cannot be obtained ten pounds of hay and five pounds of oats.

In some portions of the Philippine Islands public animals are subsisted on *palay*, native grasses, and green corn stalks. In

other localities the grass is very inferior, possessing little or no nutriment, thus necessitating the transportation of hay, which is a very expensive item.

When from any cause it becomes impracticable to supply full forage to public animals, a reduction is made by order, to affect all alike.

There is no government standard weight of grain per bushel. Grain is usually contracted for by the hundred-weight, and hay by the ton of 2240 pounds, or by the hundred-weight.

In a majority of States the weights per bushel are as follows: Shelled corn, fifty-six; on the cob, seventy; barley, thirty-eight, and oats, thirty-two pounds; bran not less than twenty pounds.

CHAPTER XVI.

TRANSPORTATION OF HORSES BY RAIL AND AT SEA.

Transportation of Horses by Rail.—Modern Cars.—Inspection of Cars.—Detachments Accompanying Horse Trains.—Implements to be Carried.—Methods of Loading.—Portable Ramps.—Expedients for Unloading.—Details of Loading Car.—Watering and Feeding.—Unloading.—Transportation of Horses at Sea.—Character of Ships Required.—Interior Fittings.—Use of Slings and Breast Straps.—Manner of Feeding.—Ventilation and Lighting.—Gangways.—Drinking Water.—Hospital Accommodations.—Forage Allowance.—Care of Animals.—Policing and Disinfecting Ship.—Unloading.—British Remount Operations in United States.

With the advent of trunk lines a steady improvement in the character of stock cars took place, and now, were it not for local laws which require animals passing through various states to be unloaded at frequent intervals, it would be possible to ship a regiment of cavalry across the continent in a week without material discomfort or injury. The modern stock car is arranged so that animals may be fed and watered en route, and the only source of trouble lies in the danger of fire from feeding hay. No hay or straw for bedding should be allowed on the floors of stock cars, for once on fire the animals would be lost before any relief could be afforded.

There are many kinds of cars used for transportation of horses, varying from the common stock car, about thirty feet long, to the palace stock car, thoroughly equipped for the comfort and safety of horses. The small cars have a capacity to accommodate sixteen and the larger cars about twenty horses. Sometimes when the exigency is great, the common stock cars are used, but if the journey is to be an extended one, and particularly when the animals are to be put immediately in service, none but cars properly equipped with hay racks and water-troughs should be accepted.

Before loading public animals every car should be carefully

inspected to see if it is in good repair throughout. Projecting nails, bolts and splinters, loose boards, broken fixtures on the hay-racks, doors or water-troughs, all mean liability to injury and discomfort for the animals. It is not uncommon for transportation companies to bid lower for government service than the tariff rates, which results in inferior service unless the utmost care is observed by commanding officers or quartermasters.

If the animals are shipped in separate trains from the troops, which is generally the case, selected detachments should accompany the horses. The men should be carefully instructed as to watering and feeding en route, and all the appliances of the particular class of cars supplied should be explained to them in detail. Water buckets, lanterns, hatchets and a hard-wood or iron bar should be supplied each train. Water can be supplied in the troughs to the horses on either side of the door, but in the usual type of stock car there is no means of watering the horses in the center opposite the door except by means of buckets. Lanterns are necessary at every stop to examine the cars to see if any animals are down, in which case the car must be entered at once and the animal restored to his feet, else he may be maimed or killed in a short time. Not infrequently a horse will kick or push his foot through between the slats and a bar must be used quickly to break the slat before the animal is disabled by his efforts to free himself. The hatchets can be used for the same purpose and to drive in projecting nails or make minor repairs.

Public horses and mules should be accustomed to loading and unloading in all sorts of places and under varying conditions, for their own training as well as for instruction of the men. At stock-yards, where many chutes are available, it is a very simple matter to load a large command with security and dispatch, but unfortunately under war conditions such facilities do not usually exist where and when most wanted. If chutes or gangways are not available, the cars should be run alongside of freight platforms, which usually have ramps at one or both ends. In this way the

animals can be led in or out of as many cars as can be side-tracked at the platform, and by a little use of a switch engine a whole train can be loaded or unloaded in a few minutes.

It is often necessary to devise expedients for loading and unloading. The easiest and safest plan is to provide portable ramps which can be carried in the forage cars or on top of the stock cars. A number of portable ramps have been devised, varying in form from a simple inclined plane of two-inch oak planks, with hard-wood cross cleats, to complicated gangways with trussed side rails, of sufficient height to prevent horses from turning around or jumping off. The essential elements of all portable ramps are that the length should be sufficient to allow the horses to walk up or down without depending entirely on the cleats and, at the same time, not long enough to bend excessively. It is usual to stiffen the floor by trestles held in place underneath the ramp by cleats on the bottom of the floor boards. If the floor boards are not firmly fastened together, then each board must have a grip iron to hook to the iron door-rail or over a cross-beam laid on the car floor. As an additional precaution, stakes should be driven in the ground at the end of the ramp to stiffen it, and if the earth is soft a cross board should be laid underneath the ground end of the ramp.

Sometimes a command is ordered to unload at a distance from any station. In the absence of portable ramps the train may be run into a low cut and the banks shoveled down against the cars sufficiently to jump the horses out. This is a very unsatisfactory method, as the track must be cleared before the train can be moved. If baled hay is carried on the train a platform can be readily improvised, and by breaking a few bales a ramp can be prepared down which the horses may be led in comparative safety.*

*Upon one occasion the author was sent under rush orders with a troop of cavalry in Arizona to the end of the Southern Pacific Railroad, then under construction. The train was stopped in rear of the construction party in the Sulphur Springs Valley, on a plain devoid of even underbrush.

The car should be well cleaned before loading the animals. Fresh sawdust or sand may be spread on the floor, but not straw. Men thoroughly accustomed to horses should be assigned to each car. The horses should be led quietly to the car door and turned over to the men detailed to do the loading. The horses are led in, alternate animals being taken to opposite ends of the cars. As many animals as possible should be put in the car unless the weather should be very hot. To accomplish this and to better utilize the hay-racks and water-troughs, the alternate animals should be faced in opposite directions. The halters should be removed from all but fractious horses and those difficult to halter. The animals which stand opposite the door should be last put in, and only gentle horses should be put in that position because the door must be opened to supply them with water, and to feed them from nose bags.

There should be no unnecessary noise or confusion and the animals should follow one another at intervals just sufficiently long to admit of the halter being removed from the horse which precedes, before the following one enters. It is necessary to have two men work together loading each end, as each horse must be held until the following horse arrives to prevent any from turning around. Sometimes an animal will resist loading. Many of them may be made to move forward by keeping them close to the preceding animal. If necessary, the animal may be forced in by pushing or by putting a rope around his hind quarters and drawing him in. With a little training both men and horses soon become accustomed to the details of loading and it progresses rapidly.

It was necessary to unload at once to join a command in pursuit of Indians. Only a small quantity of hay had been put on the train for one day's forage. With considerable labor, enough cross-ties were gathered together to build a crib work platform, against which other ties were piled so as to make a series of steps. Loose hay was spread over the steps and the little "broncho" horses, on which the regiment was then mounted, scrambled down like so many goats and without accident.

The closed door should be securely fastened before loading, and when the car is full the door through which the horses have entered should be fastened likewise.

Car floors get very slippery, but if closely packed the animals assist one another in keeping their feet. It is seldom convenient to shoe horses with calks to prevent them from slipping. Besides, horses that are rough shod are apt to seriously injure others by stepping on them when jarred by the sudden starting or stopping of the train. Valuable animals or those which are sick or disabled should not be put in with other animals. If necessary to ship them, temporary stalls should be constructed in the ends of the cars to prevent them from being jammed by the other animals.

Watering and feeding depend much upon the conditions under which the movement is being made. If stations are convenient and time admits, animals should be fed and watered in the morning after daylight and in the evening before dark. If the weather be very warm and the roadbed dusty, a third watering should take place at noon. If there is no special haste, animals should be unloaded as nearly as practicable after each twenty-four hours of travel. In good weather, if the horses are not to be used immediately after unloading, and if the cars are such that the animals can be conveniently fed and watered, unloading need not take place at such frequent intervals. Unloading should be accomplished in the reverse manner of loading. The halters should be put on quietly and the animals opposite the door led out first, the remaining animals being led to the doorway alternately from the two ends of the car and delivered to men waiting to lead them down the ramps or to the platform. When horses are loaded or unloaded direct from station platforms, great care must be used to prevent the animals from crowding and slipping off the movable gangplanks or between the cars and the platform. Circumstances and good judgment must govern in this as in everything else connected with the successful and economical management of cavalry.

TRANSPORTATION OF HORSES AT SEA.

At the outbreak of the war with Spain there was no record of previous experience available as to the transportation of animals in large numbers on long sea voyages. Very little difficulty was experienced in transporting cavalry regiments to Cuba and Porto Rico, but much doubt existed as to the possibility of safely shipping horses and mules on the long voyage to the Philippine

Figure 116. Showing construction and bracing of stalls.

Islands, and for a time it looked as if the fighting would all have to be done by dismounted men, unless animals could be procured from Australia.

Notwithstanding the expense and apparent difficulties, the necessities of the situation demanded that the effort be made, and although some animals have been injured and others lost, the experience gained has been valuable, not only to the American army,

but to all others. With modern equipments, barring unusual storms or typhoons, large numbers of animals can be safely and expeditiously transported for thirty or forty days at sea, and delivered in condition for work after a brief rest.

The experience gained teaches that ships for transportation of animals should be large and fitted with bilge keels. Before fitting up the interior, false decks should be laid throughout that portion of the ship to be used by the horses. The structural strength of the interior fittings, stanchions, stalls, etc., should be of the strongest character, all properly braced and bolted, so that there may be no possibility of timbers becoming loosened and injuring animals during rough weather (figure 116). The stalls should be constructed athwart the vessel, so as to form a system of trusses and give united strength to the whole system. The stanchions of the stalls should be strong, mortised into the floor and securely bolted overhead. It should be remembered that even in a moderate storm the weight of the animals will be thrust against the stanchions and if they give way, it means disaster to the living cargo. A passage of about three feet in width should be left at the ends of the rows of stalls in each compartment, and, if possible, in rear of the stalls, along the sides of the ship. This enables the attendants to promptly clean out the stalls and permits of the animals being led through the passages in calm weather to change their location and for exercise. After various trials as to character and size of stalls, it was found that two feet four inches in width by not less than six feet four inches in length, with sides boarded to a height of four feet four inches gave the most satisfactory results. The sides should be made of four planed boards, ten inches wide, with three-inch spaces between the boards and a similar space between the bottom board and the floor, for better circulation of air. Four or five hard-wood cleats should be nailed on the floor of the stall to prevent the animals from slipping.

When the first shipments were made, in deference to existing knowledge and theories, the system of tricing up the animals in

the stalls by means of slings was tried. Heavy breast boards were put in front of the animals, to prevent them from plunging forward out of the stalls in rough weather, and feed boxes were hung on the outside of the breast boards (figure 117). So many animals were badly bruised against the breast boards that they were abandoned, and broad canvas straps or guards were substi-

Figure 117. Showing transport fitted with breast boards and feed boxes.

tuted. The breast straps should be made of hemp canvas, about eight inches wide, with a spreading stick and two grummets at each end. The canvas should be heavy and stitched to strengthen the edges. Ropes should be passed through the grummets to tie the breast straps to the stanchions. By placing a smaller strap over the animal's neck and attaching it to the breast strap in the same manner that a light buggy harness is arranged, the halter

ropes may then be adjusted in length so as to allow the animals considerable room for swaying with the vessel.

After much experience in all kinds of weather, it was found that the animals got their "sea legs" much quicker by being allowed to sway with the motion of the ship, and the tricing-up slings were abandoned, except that a few were carried to support weak or sick horses in calm weather. The slings were responsible for intestinal disorders, injuries to the sheath and other troubles incident thereto. During rough weather, the breast guards or straps supported the animals without bruising them, and in calm weather could be detached to allow the horses to swing out in front of the stalls.

The utmost care should be taken that no nails or projections of any kind are left about the stalls on which an animal may wound or bruise himself. When no space is left in rear of the stalls, as was the case in fitting up several ships, sheets of zinc nailed to the side of the ship in the rear of the stalls will be found efficacious in preventing the animals from unduly chafing their tails.

At first animals were fed from feed-boxes and mangers but experience caused this method to be abandoned in favor of feeding directly from the deck. To provide for this, slats running lengthwise of the vessel were nailed to the false deck in front of the stalls and the forage was placed between them. The animals appeared to thrive better when feeding directly from the deck, and soon learned to adjust themselves to the ordinary motion of the sea so as not to plunge out of their stalls when the long halter chains were attached. It was found advisable to have both short and long halter chains or straps, because in rough weather an animal might be pitched forward while his head was down and be jerked into a somersault by the long halter chain, which it is necessary to use when feeding from the deck (figure 118).

No detail can be neglected in the transportation of animals, but the item of ventilation is of the utmost importance. The

method found most effective is that used in deep mines—the combined blow-in and exhaust system. By the use of this system, the air may be kept almost as pure in the hold as between decks above. If the ventilation in any part of the ship is not good, the animals should be changed from time to time to other parts, and

Figure 118. Stalls without breast boards. Slats arranged for feeding from deck.

in good weather, those animals which appear weak or needing a change should be led up on deck or to the hatchways.

Every animal transport should be provided with an electric plant for lighting the ship and for running electric fans in the compartments occupied by animals, for the purpose of forcing in fresh air and exhausting foul air from parts of the vessel not sufficiently ventilated by the windsails attached to the hatches and ports. The

windsails, if carefully attended, supply the fresh air all right, but some other exits than the hatches should be provided for forcing out the foul air which hangs under each deck. The fresh air should enter at the floor of each compartment and the foul air be exhausted near the top. Ports should be fitted with windscoops.

No ship should be used as an animal transport which has hatchways too small to admit of inclined gangways with landings. Not only is this necessary for moving animals from one compartment to another, but also because of the greater facility with which the animals may be loaded and unloaded (figures 119 and 120). If the inclined gangways cannot be put in through the hatches, the animals must be loaded and unloaded in horse boxes, or slings, a very slow and tedious process, particularly when resorted to for unloading at ports without wharf accommodations, or when necessary to disembark on an exposed coast, as happened at Santiago de Cuba and various points in the Philippine Islands (figures 121 and 122).

An abundant supply of pure drinking water, not less than ten gallons per day for each animal, must be provided. Arrangements should be made for distributing the water to each compartment through a hose provided with a faucet at the end, so that buckets can be filled without waste. A condensing apparatus should form part of the equipment of each vessel, but for fear of a break-down or failure to furnish a sufficient quantity of water, an ample supply should be carried in the ballast tanks. A deck tank should be provided into which the water should be pumped for distribution, by gravity, to the various animal compartments. Barrels should be at hand in each compartment for use in connection with the hose in the distribution to the horses. The filling of buckets from hose is a rather slow process, but the water is not wasted to such an extent as when dipped from barrels when the ship is rolling. Unless great care is taken the barrels are soon fouled with dirty buckets.

A small water-trough, holding enough for two animals, and arranged on wheels, as a push cart, is preferable to buckets. The hose can be constantly refilling it, and it avoids the difficulty of having two horses trying to drink from the same bucket. Another simple plan is to carry "nests" of assorted sizes of ordinary zinc washtubs, which can be placed on the deck at each alternate head-

Figure 119. Leading animals to the main deck.

post so that two horses can drink from the same tub at the same time.

A room should be provided for tools, instruments and horse medicines. Canvas bags or baskets should be provided for collecting manure, which should be thrown overboard, together with the wet or soiled hay, which may clog the scuppers when the decks are washed.

The question of hospital accommodations has received much consideration. A few large stalls near the hatchways will afford opportunities to treat ordinary cases. If the deck load is restricted, as it should be, to forage for the first week out, the space will then be available for deck stalls, which can be quickly prepared, and to which ailing animals may be taken for fresh air and treatment. Notwithstanding that every effort was made to provide the best patterns of large canvas slings heretofore considered essential at sea, they were found to be more injurious than beneficial, and the percentage of loss decreased directly as the slings were discarded.

The transport being fitted up in accordance with approved methods, the feeding and care of the animals then devolves upon the officers and men assigned to duty. Upon the manner in which the work is performed will depend the success of each voyage so far as landing animals fit for service. The transports are first-class floating livery stables, and in many voyages the percentage of loss has been less than would occur in the same length of time if the animals had been turned loose in a pasture or corral. As the government charters animal transports, the experience gained cannot be made as available as has been the case on the passenger transports owned by the United States.

The consensus of opinion of the officers who have reported on various voyages, is that a certain routine of feeding, watering and care will answer for the average animal transport in ordinary weather, and that an adherence to prescribed rules will keep the animals in good condition for service. The officer in charge, however, should use his judgment when things do not go right, and if it be a question of ship management, consult the captain, and if it pertains to the feeding and care of the animals, or of any individual animal, such correction as can be applied should be done whether specified in his instructions or not.

For short voyages and where the animals are to go immediately on service, they may be shod before loading. When the voyage

will occupy a month or more it is not desirable to shoe, as the hoofs will increase in length to such an extent in that time that it will be necessary to replace the shoes after landing.

The day previous to embarkation the animals should be fed bran mash. For the first thirty-six hours at sea the full ration of

Figure 120. Leading animals from the main deck to lower compartments.

hay should be fed but no grain. After this period, half ration of oats (six pounds) should be given, but if large animals show signs of losing flesh, their feed should be increased. It will not do to apply an inflexible rule to feeding animals, for a small horse or pack mule will keep fat on an allowance which will cause the ribs of a large animal to show prominently. If the animals clean up the

hay an extra allowance should be given during the night. Bran mashes should be given at intervals of three or four days, and if intestinal disorders follow the feeding of oats, a wet mixture of bran and oats should be tried. Animals should receive the usual ration of salt in the bran mash. Carrots in small quantities may prove beneficial to animals whose appetites are not normal.

For the care of the animals, it will usually be found advisable to divide the attendants into permanent squads, four or five in number, and allot to them certain parts of the ship. If troops travel with their horses, each detachment should look after its own animals. Ordinarily, however, the attendants are civilian packers, teamsters, or men hired for the voyage.

The animals should be fed at the usual hour in the morning, soon after daylight. After the men have been served with breakfast, the policing of the vessel should begin by removing all manure and refuse hay (no bedding is used on transports) and throwing it overboard. Then, in turn, the squads should have the use of the hose for washing and scrubbing the decks. After each compartment has been cleaned, such disinfectant as may be supplied should be applied to the deck space in front of the stalls used for feeding the animals, and to the stalls also. A thorough policing should always precede disinfection, else the attendants may conceive the usual idea that the odor of a disinfectant renders filth innocuous. Vinegar, creolin, chloro-naphtholeum, chloride of lime and carbolic acid, constitute the usual disinfectants supplied. On account of its pungent odor, chloride of lime should not be used between decks when other disinfectants are at hand.

When the morning's work is completed, the vessel should be thoroughly inspected, particular care being taken to see that the scuppers are not clogged. Responsibility should be absolute in each squad, and every dereliction should be fixed upon the individual and such deprivation or punishment as the neglect seems to merit should be awarded by the officer in charge.

The ship's crew attends to the sailing of the ship while the animals are cared for by civilians employed, or soldiers detailed for the purpose. It is a disadvantage to have too many men, but a sufficient number should be taken to allow for many to be off duty by reason of seasickness the first week out of port. Sometimes the detachment is fed by the ship's cook, but on other occasions galley room is provided for cooking. The mess should be carefully looked after to see that the galley and surroundings are kept clean and that the food is properly cooked and served.

For the whole cargo of animals there should be one senior non-commissioned officer, three cooks, one forage master, one veterinarian and one assistant, and for each one hundred animals there should be one non-commissioned officer and fifteen privates. When the personnel consists of civilian employees a train-master, wagon-masters and civilian teamsters take the place of enlisted men. After making details for guard, kitchen police and mess attendants and the usual allowance for sickness each private or teamster will be required to care for about ten animals. When organized wagon and pack trains are being transported with the expectation of immediate field service upon disembarkation, teamsters and packers should accompany the trains.

The ship should be apportioned off so that each non-commissioned officer or wagon-master may know exactly what animals and space he is responsible for, the stalls being numbered for the purpose of division. Each non-commissioned officer or wagon-master should make his own details for guard, call his own rolls, keep the forage record, and note on a bulletin-board the sick animals and the names of the men on guard. The senior non-commissioned officer or train-master should exercise general supervision, keep the forage accounts, the morning report and be responsible to the officer in charge that cleanliness and good order are enforced.

The officer in charge should make a general inspection three times each twenty-four hours. Neglect of duty or abuse of ani-

imals should meet with just and summary punishment. Disputes

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Figure 121. Unloading animals, Ponce, Porto Rico.

If the animals must be unloaded into the water to swim ashore, great care should be exercised. If the stall is used it should have

sides high enough so that the animal will not try to jump out, and the floor should have heavy cleats. Guy ropes should be attached to keep the stall from striking the sides of the ship or the hatch coming. Both ends of the stall should be made to open, for an animal which will balk at walking into a box may be coaxed to walk into an open passage.

Figure 122. The flying stall.

The bolts should be arranged so that the doors may be opened by a line from the ship. A line should be attached to the halter of the animal in the stall, and thrown to men in a row-boat, which should lay to, near by, where the stall will strike the water when lowered. When the door is opened the stall should be allowed to sink, the oarsmen give way, and the animal swims out, being

guided by a man in the stern of the boat holding the halter rope. If the water is calm the animal may be conducted towards shore and then turned loose to make his way in. If there are breakers the animal should be conducted to shore, else in his fear he may turn and follow back to the ship or swim out to sea and be lost.

In smooth water where a lighter can be used, it is best to construct a ramp leading from the ship to the lighter ; this will greatly hasten the unloading and save the animals from risk or injury.

Figure 123. Cavalry horses swimming ashore at Santiago.

Many of the animals which accompanied the expedition to Santiago in 1898 were unloaded directly into the sea by means of sliding ramps run out through the side ports. The ramps were arranged so that the weight of the horse, as he moved out from the side of the ship tilted the outer end downward, forcing the animal into the sea, when he made his way to shore (figure 123).

The British Remount Service had more experience in the purchase and shipment of horses and mules at sea during the two

years of war in South Africa than any nation previously known in history. The animals were purchased generally throughout the Western States, and for the most part concentrated in Missouri, where the British government had a large remount depot. Here the animals were carefully inspected, branded and subjected to the mallein test for glanders. When in prime condition they were shipped by rail to New Orleans to the remount station, where injured or unfit animals were culled out. The ship being ready, the animals were loaded with great care, and everything possible done to insure a safe and speedy voyage to the distant theater of war, to which more than 200,000 animals were shipped after the Boers took the field.

The British methods differed slightly from the American, inasmuch as they required the owners of the vessels to fit them up for the transportation of animals and provide the necessary forage and utensils, also the foreman and attendants required for the care of the animals and two carpenters in addition to the ship's carpenter, to keep the stalls in order. The fittings were erected by the owners from patterns and specifications provided by the Remount Department. A gratuity of £2 (about \$10) was allowed on each horse, and £1 on each mule, landed in good order, in addition to the regular price of freight.

The owners of vessels were required to furnish water, forage, halters, utensils, fittings, ventilation and attendants, to the satisfaction of the remount officer at the port of embarkation.

The attendants required were 1 head foreman, 3 assistant foremen and 1 attendant for every 15 horses or 20 mules. The articles required to be provided by each animal transport were specified in great detail in the contracts and included all the implements and measures necessary in cleaning and feeding the animals and for policing and ventilating the vessel.

The experience obtained was of infinite value when the great war in Europe began in 1914. Many thousands of horses and

mules have been transported to England and France for their armies, and now (1918) the American army in France is being supplied with animals as fast as transports become available.

The immense increase of motor vehicles has materially affected the production of horses suitable for military purposes and naturally the number of men qualified to care for and train horses has also become much reduced. It is fortunate for the nation that during this period of change the army has remained steadfast in its demands that a knowledge of the requirements as to public animals, especially their purchase, care and transportation, should be maintained among officers. In the meantime the standards of instruction at the Mounted Service School have been advanced beyond anything hitherto expected or deemed possible in this country, and officers and men of the regular army are afforded ample opportunity to acquire a knowledge of equitation, training and the care of public animals.

GLOSSARY OF TERMS USED IN EXAMINATION FOR SOUNDNESS.

The Bars. This term is used to designate two entirely different parts of the horse—the bars of the mouth and the bars of the foot. The bars of the mouth comprise the parts of the lower jaw, on each side devoid of teeth and lying between the incisor and molar teeth, where the bit rests. The bars of the foot consist of the two horny portions starting from each side at the heel and coming together under the point of and to a certain extent enclosing the frog.

Blemish. A scar, condition or sign of former disease, which may mar the appearance without affecting the serviceability of the animal.

Broken Knee or Capped Knee. Injury to the knee arising through a fall, striking against the manger when pawing or other accidents and usually manifested by scars or swelling.

Broken Wind. Indicated by difficulty of breathing and prolonged effort of the abdominal muscles in performing the act of expiration. Usually accompanied by a hacking cough.

Buck or Calf Knee. A condition where the front of the fore leg, viewed from the side, appears to curve to the rear, the curvature being most noticeable at the knee.

Calking. Injuries about the top of the foot (coronet), caused by the tread of another foot of the horse on himself, or by the shoe of another animal. Injury occurs most frequently when shoes are fitted with calks.

Canker. Disease of the foot, principally of the frog and sole due to a vegetable parasite which thrives best in dampness.

Capped Elbow. Term applied to an enlargement at the point of the elbow. Frequently called *shoe boil* because usually due to pressure of shoe when lying down.

Capped Hock. Enlargement at the back (points) of the hock, arising usually from bruises received in rubbing against the sides of the stall. Swelling may be temporary but often remains permanent.

Cinch Sores. Sores under the body in rear of the elbows. Usually originate as shoe injuries and are continued and extended by rubbing of the girth or cincha.

Clicking or Forging. Striking the toe of the hind foot against the bottom of the shoe of the fore foot, making a noise from which the name is derived.

Cocked Ankles or Knuckling. A partial dislocation of the fetlock joint, causing the joint to knuckle or make a convex angle to the front.

Contracted Heels or Hoof Bound. Atrophy or shrinking of the tissues of the foot which dries out the frog and draws the heels together. Usually observed in fore feet to a much greater extent than in the hind.

Cribber or Crib Biter. A horse addicted to the habit of gnawing the wood work about the stable, usually the manger.

Curb. In a normal state the back part of the hind leg from the point of the hock down to the fetlock should be a straight line. When there is a bulging backward of this line at the hock the lesion is called curb.

Defect. An abnormal condition of any part of the horse which may affect his usefulness and which may or may not be classed as an absolute unsoundness.

Dock. The solid part of the tail.

Farcy Buds. Nodes which form under the skin and vary in size from a buckshot to a walnut. They are sometimes called farcy buttons.

False Quarter. When the coronary band at the top of the foot, from which the crust or horn of the hoof is secreted, becomes involved in serious inflammation through quittor, sand cracks or other injury or disease, the secretions become arrested and a break in the hoof wall, immediately below the place of injury, occurs, and this complete and more or less permanent separation is called false quarter.

Fistula. An ulcerous sore on the surface, connected by ducts with a diseased internal cavity. With horses the term is applied almost wholly to ulcerous lesions of the withers.

Founder or Laminitis. An inflammation of the sensitive laminae of the feet, with a tendency to destruction of tissues, causing stiffness and lameness. Often results in the formation of a series of ridges or rings around the surface of the hoof.

Grease. A disease of the heels usually associated with a parasitic fungus and offensive discharge.

Grunting. A noise emitted by a horse when suddenly moved or started. Usually indicates that the animal is a roarer and probably unsound.

Interfering.—Speedy Cut. A horse interferes when he strikes the inner side of the fetlock of either fore or hind foot, with the corresponding foot of the other side, causing a bruise or cut. When the location of the cut is on the inside of the fore leg near the knee it is called *speedy cut*. Other terms applied are *brushing* when the injury is slight and *cutting* when it is severe.

Knee Sprung or Over in the Knees. A deformed articulation of the knee joint which causes the fore leg to bend forward at the knee instead

of maintaining the usual vertical direction of the forearm and cannon bones, as viewed from the side.

Near Side. The left-hand side of the horse facing with the animal.

Off Side. The right-hand side of the horse facing with the animal.

Overreach. Overreach is where the shoe of the hind foot strikes and injures the heel or quarter of the fore foot; the injury usually occurs to the outside of the fore foot, but sometimes comes squarely against the heel and not infrequently with sufficient force to tear off the fore shoe.

Paddling. The term describes the peculiar motion of the fore feet, at a walk or trot, when instead of being carried forward in a vertical plane, they are thrown forward with a curved motion outside of this plane.

Parrot Mouth. This exists where the incisor teeth of the upper jaw project over and in front of those of the lower jaw, no wear of the teeth taking place.

Poll Evil. A fistula in the poll or top of the head near or between the ears.

Quittor. This term applies to several varieties of foot affections wherein the tissues undergo degeneration, and are eliminated or sloughed off by suppuration. In some forms it is not inaptly termed foot rot. Its more common form is a fistula of the coronet which burrows into the heels and quarters.

Ring Bone. An ossification or bony tumor on or around the pastern bones resulting from inflammatory action.

Roaring: Whistling. Horses are sometimes affected with a chronic disease that causes a loud unnatural noise in breathing; such animals are called roarers or said to have thick wind. The noise is made when the air is drawn into the lungs. Whistling is a shrill variation of the sound emitted by a roarer.

Sand Cracks; Quarter Cracks; Toe Cracks. A sand crack is a fissure in the horn of the walls of the foot, and which usually extends in the direction of the bony fibers. When the opening occurs on the side or quarter of the hoof it is called a quarter crack, and when directly in front is called a toe crack. Sand cracks may involve only the outer parts of the wall or they may be deep and involve the whole thickness of the wall and the soft tissues beneath.

Scratches or Cracked Heels. Soreness and tenderness in the hollow of the heels, somewhat akin to chapped hands. A similar condition sometimes appears behind the knee, called *malanders* and sometimes in front of the hock, called *salanders*.

Scirrhus Cord. An unfavorable result of castration causing an indurated swelling at the end of the divided cord and an enlargement of the scrotal sack.

Seedy Toe. This disease consists in a separation of the crust of the hoof from the laminae beneath, the diseased laminae being unable to maintain union between the structures. It may occur on the quarters as well as the toe of the hoof.

Shoe Boils. Same as *capped elbow*.

Sidebones. Ossification of the lateral wings of the coffin bone; seldom found on the hind feet but more common on the fore feet. Best detected by feeling the top of the foot, on each side, inside the line of the coronet.

Sitfast. From one of many causes a swelling or saddle tumor occurs; from neglect or frequent occurrence it becomes hard and the skin thickens and loses its vitality, often adhering to the bottom of the sore but separated from the surrounding living skin. At this stage a saddle sore becomes a sitfast.

Spavin. The disease may be blood, bog or bone spavin; all are located in and about the hock. Blood spavin is a varicose condition of the vein in front and to the inside of the hock; bog spavin is a distention of the bursa of the hock joint and is found in front directly below the seat of blood spavin; the bone spavin may be slight or may involve the articular faces of all the bones of the hock and is the most serious form. Some forms of spavin are very difficult of detection.

Splint. A bony enlargement on the cannon bone, usually of the fore leg only and on the inside, between the knee and fetlock joint. Sometimes the splint forms across the leg on the rear face of the bone and between it and the suspensory ligament or tendon; it is then called a pegged splint.

Stringhalt. A spasmodic muscular contraction, usually affecting one hind leg, but sometimes both, causing an involuntary jerking up of the leg. It may occur only at intervals and at particular gaits.

Thorough-Pin. A bursal enlargement at the upper and back part of the hock, beneath the extensor tendon. The swelling usually appears on both sides and may by a little pressure be forced from one side to the other.

Thrush. Disease of the frog of the foot characterized by excessive secretion of unhealthy matter.

Windgalls. Soft, puffy swellings usually in the neighborhood of the fetlock joints.

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